PB-228 453

FISH AND WILDLIFE AS RELATED TO WATER QUALITY OF THE ILLINOIS RIVER BASIN. APPENDIX VII

Clarence F. Pautzke

Fish and Wildlife Service
Washington, D. C.

December 1963

DISTRIBUTED BY:

NTIS
National Technical Information Service
U. S. DEPARTMENT OF COMMERCE
5285 Port Royal Road, Springfield Va. 22151

PB 228 453

UNITED STATES DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

Clarence F. Pautzke, Commissioner

Library
Environmental Protection Agency
Region VII

APPENDIX VII

FISH AND WILDLIFE AS RELATED TO WATER QUALITY OF THE ILLINOIS RIVER BASIN

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
U S Department of Commerce
Springfield VA 22151

A Special Report on
Fish and Wildlife Resources

December 1963

1.

158

Are We Choking In
Our Own Garbage?
During the latte
Project personn
waterfowl and
vicinity of a
near Mossvil
water
Officials Not
Worried By
Pollution Here
Doesn't Alarm Officials
A-12
PEORIA JOURNAL STAR—Sun., Oct. 21, 1962
Will We Bury Ourselves
Solution to Pollution Requires
By JOSEPH R. HIXON
New York Herald Tribune Service
New York.
Two years ago, 21 persons in Brookfield
Conn., came down with a dangerous liver infec
tion, called viral hepatitis—jaundice. The ou
Kill
Below: Thousands o
carp were killed by th
River Pollution
h Service, and Dr. Paul M
chemistry at Duke Univer
ed in a panel discussion o
Health and Industry Respon
pollution, the two agreed, is a
not be solved by government
Towns, cities, companies
Veteran Fisherman Recalls
Days When Fish Were Thick
ducks
. Some
local sportsmen
birds and nursed them
th before releasing them.
the birds observed were
fering from skin blisters.

REPORT OF THE REGIONAL DIRECTOR

Bureau of Sport Fisheries and Wildlife

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
1006 WEST LAKE STREET
MINNEAPOLIS, MINNESOTA 55408

In reply refer to:

RB

December 10, 1963

Mr. H. W. Poston, Water Program Director
Region 5, U. S. Public Health Service
5555 South Archer
Chicago, Illinois

Dear Mr. Poston:

This is our detailed report on the effects of water quality on the fish and wildlife resources of the Illinois River Basin. It has been prepared under the authority and in accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and is in response to your request for our participation in the Great Lakes-Illinois River Basins Comprehensive Study.

The report briefly summarizes our findings and is supported in detail by information included in the attached Substantiating Report.

The production and maintenance of the fish and wildlife resources of the Illinois River Basin are dependent upon water quality that is suitable for their existence. These criteria are described in relation to the needs, both present and future, of the aquatic wildlife of the basin.

The drainage area of the basin is distributed over three states, extending from the Des Plaines River drainage of southeastern Wisconsin to the Kankakee River drainage of northwestern Indiana. It includes the Chicago area of Lake Michigan and extends 327 miles southwest to the confluence of the Illinois and Mississippi Rivers at Grafton, Illinois.

Numerous tributary streams of the Illinois River have fair to good quality water during most seasons of the year. Sand or mud deltas at the mouths of some tributaries frequently make access from the main river channel difficult.

Most of the Illinois River bottomland below LaSalle is divided into levee districts with levees paralleling the river. Upstream from LaSalle, river banks rise 10 to 20 feet above normal stages of the river. Farther downstream, at Havana, the banks are less than 3 feet high. Bottomland lakes and ponds are connected to the river with access to them depending upon river stages. The lakes and ponds are heavily laden with silt. Because of their turbid conditions, these lakes and ponds do not favor the growth of aquatic vegetation.

Fish

No known fish life occurred in the Illinois River north of Utica in 1920. In 1962, electrofishing revealed a few small carp and goldfish in the North Shore Channel section. However, no fish were collected in the Chicago Ship and Sanitary Canal section during the 1962 surveys. The number of fish species present in the Illinois River from a point near Lockport and downstream indicates a rich and varied fauna. Over 170 species occur. The river provides a varied type of habitat, and the species list includes fish with many different ecological requirements.

Many species of game fish present in the tributary streams are not found in the Illinois River, due to adverse water quality conditions in the main river. The abundance of commercial fish species, as with sport fishes, is dependent upon several factors, including water quality and changing ecology.

The preponderance of rough fish species over pan fish and other game fish species in the Illinois River indicates that a degraded environment exists. The more pollution-sensitive species do not remain in these unfavorable environments.

The sport fishery of the Illinois River Basin is not being utilized to its fullest potential. Although there is considerable fishing activity in the basin, much of it occurs in the lateral lakes and bays. Heavy fishing pressure occurs in waters near high population densities. The Fox River, in the Chain-O-Lakes region, and Lake Chautauqua support heavy fishing pressure. Fishing is sporadic south of Havana with use dependent upon water conditions during the summer months. Unfortunately, the majority of the lateral lakes that provide fishing are not close to centers of heavy population.

No significant reproduction of commercial fish exists in the Illinois River above Starved Rock Pool. The status of the commercial fishing industry in the Illinois River Basin is poor. This is due to the small size of the marketable species, the loss of large eastern markets, and deterioration of production habitat through drainage of bottomland spawning areas.

Wildlife

The main stem of the Illinois River drains a rich agricultural area and it is not too surprising to find that less than 5 per cent of this land remains in low brush and herbaceous cover. This lack of cover in the flood plain and uplands tends to limit the increase in game populations, especially small game.

The white-tailed deer is the only big game species in Illinois. The first open season on deer since 1900 was possible in 1957 following a program of active management of this species. Deer numbers are increasing and should continue to do so in proportion to the amount of available woodlands and browse vegetation.

Fair populations of quail are found along the Illinois River from Peoria south, wherever suitable cover conditions exist. Ring-necked pheasants are abundant along the Illinois River north of Peoria. However, areas subject to seasonal flooding do not support good populations. The pheasant is the only game bird that has been able to adapt itself to the intensive type of agriculture practiced on the better soils. Limited populations of Hungarian partridges may be found in three or four counties in the northeastern corner of the state. Cottontails, gray squirrels, and fox squirrels also are important upland game species in the basin.

Some 62,000 acres of water in ponds, sloughs, and shallow lakes flank the river on both sides between Spring Valley and Meredosia, Illinois. This is the heart of the duck habitat in the Illinois Valley. Although the quality of this area has been reduced over the years, it still provides some of the better mallard duck shooting in the nation.

Mallards, pintails, and black ducks constitute over 80 per cent of the migrant ducks using the Illinois River. Corn is an important food item for these birds, but the aquatic and moist soil plants associated with the flood-plain lake region are essential in maintaining the waterfowl populations of the Illinois River Valley. During the era of baiting and live decoys around 1920, some areas of the Illinois Valley became famous for goose hunting. Drainage of flood plain marshes, changes in land use, and deterioration of the habitat through pollution brought an end to the good hunting. Fair numbers of blue geese and snow geese continue to stop and rest on the larger lakes and refuge areas; however, they provide little shooting.

Water Quality

Generally speaking, the quality of the water in the Illinois River downstream from the junction of the Des Plaines and Kankakee is within limits considered safe for fish and wildlife. Biologically, however, conditions do not meet the necessary standards for healthy maintenance of aquatic life. Algae, an important element in the aquatic habitat, has not been collected in stream investigations above the Starved Rock Pool.

Studies on the flood-plain lakes of the Illinois River near Havana have revealed that siltation and other forms of pollution have brought about extreme changes in the bottom fauna of lakes investigated. Siltation has drastically reduced the storage capacities of the lakes.

The abundance of nutrients in the waters of the flood-plain lakes accounts, in part, for the extreme turbidities during summer months. Much of the high fertility, sediment, and turbidity is the result of drainage of surrounding farmlands.

The history of industrial pollution of the waters of the Illinois River dates back to at least 1885. Chicago was becoming an industrial giant, dumping its untreated wastes directly into the river. Pollution from Chicago also included the wastes emanating from the Chicago Stockyards. Downstream movement of silt and pollution has almost eradicated aquatic plant growth in the flood-plain lakes.

Satisfactory water quality is essential in developing and maintaining populations of fish and game in and along the Illinois River and tributaries. This will entail the establishment and enforcement of minimum standards of water quality.

Consequently it is recommended that:

1. Priority be given to the development of pollution abatement measures in the grossly polluted zone above Joliet, Illinois.

2. Measures be developed and implemented to prevent "accidental" discharges of pollutants.

3. Water quality studies be made of all waste discharges containing chemicals or other materials in quantities that would have a significant effect on fish and wildlife.

4. Turbidity be controlled by means of a comprehensive program of improved land use practices, in combination with a system of silt-detaining structures to be constructed throughout the basin.

5. Drainage, channelization and levee development within the basin be held to a minimum in order to reduce siltation and water turbidity.

6. Until water quality standards for fish and wildlife are more firmly established, discharges of wastes into waters of the Illinois River basin should:

   a. contain at least 4 p.p.m. dissolved oxygen.
   b. have a pH of between 5.0 and 9.0.
   c. have a temperature below 85° F. from May through November.

The Substantiating Report has been endorsed by the State of Illinois Department of Conservation and the Bureau of Commercial Fisheries.

Sincerely yours,

R W Burwell

R. W. Burwell
Regional Director

TABLE OF CONTENTS

Page Number

Frontispiece

Report of the Regional Director . . . . I - V

Substantiating Report . . . .

Preface 1

Summary 2

Introduction 4

Description of the Illinois River Basin 6

Fish 9

- The Distribution of Fishes of the Illinois River Basin . . 9
  - Commercial Fishes 12
  - Sport Fishes 13
- Extent of Present and Future Use 18
- History of the Commercial Fishery 25
  - Deterioration of the Illinois River Commercial Fishing Industry. 27
  - Present Status of the Illinois River Commercial Fishing Industry. 28
- Monetary Values of the Commercial Fishing Industry 29
- Summary of Present Status 31
- Historical Summary of Biological Aspects of Pollution . . 32
- The Identity of Conditions and the Environmental Changes Resulting from Pollution 35

TABLE OF CONTENTS (Continued)

Page Number

Fish Management Efforts on the Illinois River. 44

  Present Management Efforts 44

  Past Management Efforts 46

  Future Management Possibilities 47

Potentials of the Commercial and Sport Fisheries 48

Wildlife 52

Historical Background 52

Present Habitat Conditions 56

  Topography 56

  Forest Cover 57

  Upland-Game Cover 58

  Wetland and Aquatic Habitat 58

  Agriculture and Mining 61

Wildlife Distribution, Status, and Trends 62

  Big Game 63

  Small Game 63

  Furbearers 66

  Migratory Game Birds 67

  Non-Game Species 71

Present Use of Wildlife Resources. 72

  Hunting 72

  Trapping 76

  Wildlife Observations 76

TABLE OF CONTENTS (Continued) Page Number

Projected Future Use to Year 2010 76

Management Areas 82

Public 82

Private 85

Discussion of Water-Related Wildlife Problems 86

Acknowledgement 97

List of References 98

Appendix - Letter from Illinois Department of Conservation

LIST OF TABLES

Table Number

FISHERY SECTION:

1 Lengths, Drainage Areas, and Flows of the Major Tributary Streams to the Illinois River 8

2 Fish Species of Importance in the Illinois River Basin . . 14

3 Summary of Fishing License Sales, Illinois Basin Counties, 1950, 1955 and 1960 22

4 Commercial Fish Harvest, Illinois River Pools, 1961 . . . 29

5 Estimated Value of Commercial Fishing Equipment and Calculated Value of the Catch by Navigation Pool, 1955-1961 30

WILDLIFE SECTION

6 Land Use in the Illinois River Basin - 1960 59

7 Loss of Non-Agricultural Bottomland Along the Illinois River Mainstem due to Drainage and Levee District Developments 60

8 Illinois Rank in Mississippi Flyway, Waterfowl Stamp Sales from 1934 to 1961. 72

9 Resident Hunting License Sales Compared with Waterfowl Stamp Sales in Illinois, 1936-1961 74

10 Hunter Use and Harvest Data for three Public, Waterfowl Hunting Areas - 1954-1962 75

TABLE OF CONTENTS (Continued)

Table Number Page Number

WILDLIFE SECTION
(Continued)

11 Hunter Use and Harvest, Des Plaines Public Upland Game Hunting Area 1954-1962 75

12 Census Data, Illinois River Mainstem Counties, 1910 to 1960, with Projected Figures to the Year 2010 . . . 77

13 A Comparison of Hunting License Sales for Illinois River Counties with Mainstem Frontage, For the Years 1951, 1955 and 1960 81

14 Size, Use, and Management of Seventeen Publicly-Owned Wildlife Areas along the Illinois River Mainstem 84

15 Suspended Solids in Parts Per Million at Various Sampling Stations Along the Illinois Waterway, 1961-1962 88

LIST OF FIGURES

Figure Number After Page Number

FISHERY SECTION

1 Map of the Illinois River Basin 6

2 Map Showing Boat Launching Sites, Access and Public Fishing Areas of the Illinois River Basin 7

3 Map Showing Distribution of the Walleye in the Illinois River Prior to 1919 10

4 Map Showing Distribution of the Northern Pike in the Illinois River Prior to 1919 10

5 Map Showing Distribution of the Largemouth Bass in the Illinois River Prior to 1919 10

6 Map Showing Distribution of the Smallmouth Bass in the Illinois River Prior to 1919 10

7 Graph of the Estimated Average Numbers of Fishermen Per Stream Mile as Related to Pollution Zones Along the Illinois River 17

LIST OF FIGURES (Continued)

Figure Number After Page Number

FISHERY SECTION (Continued)

8 Graph of Dissolved Oxygen Determinations and Temperatures in the Vicinity of Locks on the Illinois River 23

9 Graph of Commercial Fish Harvest and Numbers of Commercial Fishermen, 1899-1961 26

10 Photo of a Present Day Fish Market at Peoria, Illinois 30

11 Photo Showing Fish Processing in a Modern Market . . 30

12 Photo Showing Modern Methods of Display and Sale . . 31

13 Photo of Original Fish Market at Peoria, Illinois . . 31

14 Photo of Original Fish Market at Peoria, Illinois . . 31

15 Early Photograph of Fishermen of the Day 31

16 Map of Zones of Water Quality on the Illinois River . 41

17 Photo of Detergent Foam at LaGrange Dam 42

18 Photo of Detergent Foam at Lockport Lock 42

19 Profile of the Illinois Waterway with Potential Fish Production Areas 49

WILDLIFE SECTION

20 Photo of Flood Plain Lake Habitat near Bath, Illinois 57

21 Photo of Drainage and Levee District Lands near Havana, Illinois 57

22A Map Showing Extent of Illinois River Basin Woodlands 57

22B Map Showing Portions of the Illinois River Basin Open to Deer Hunting in 1961 57

23A Map Showing Bobwhite Quail Harvest Distribution . . . 63

23B Map Showing Ring-necked Pheasant Harvest Distribution 63

LIST OF FIGURES (Continued)

Figure Number WILDLIFE SECTION (Continued)		After Page Number
23C	Map Showing Cottontail Rabbit Harvest Distribution	63
24	Graph Showing Peak Numbers of Waterfowl Using the Illinois River During the Fall of 1961 . .	68
25	Photo of a 1920 Goose Hunt	70
26	Photo of an Evening Feeding Flight of Canada Geese Along the Illinois River	70
27	Graph Showing Peak Numbers of Scaup Using the Illinois and Mississippi Rivers During 1950-1961, Fall Migrations	71
28	Graph Showing Mourning Dove Nesting Trends 1955-61	71
29	Photo of a Public Duck Blind on the Illinois River	73
30	Photo of Duck Hunters on the Stump Lake Management Area	73
31	Photo of a Satisfied Duck Hunter at Stump Lake	73
32	Photo of a Waterfowl Observer on the Chautauqua National Wildlife Refuge	73
33	Graph Showing Resident Hunting License and Migratory Bird Hunting Stamp Sales in Illinois 1941-61 .	78
34	Map Showing Location of Illinois River Basin Public Waterfowl Management Areas	82
35	Photo of a Private Duck Club Entrance Sign . . .	86
36	Photo of a Private Area Clubhouse near Bath, Illinois	86
37	Photo of a Private Management Area Water Control Structure	86
38	Photo Showing Flood Conditions near Havana, Illinois, Spring 1962	86

SUBSTANTIATING REPORT

A-11

PREFACE

Following the entry of the United States Department of Justice into the latest litigation concerning the diversion of Lake Michigan water into the Illinois waterway, the U. S. Public Health Service was authorized to direct a comprehensive investigation of water quality management of the Illinois River Basin. The scope of their investigation was enlarged from the usual limited pollution study to one which considers the needs of all legitimate water users. The Bureau of Sport Fisheries and Wildlife has been asked to provide information relative to the fish and wildlife resources of the Illinois River Basin as an appendix to this comprehensive study.

The long-time abuse of the natural resources of the basin has resulted in the realization that steps must be taken to ameliorate conditions now existing. It is the purpose of this report to recommend general methods of amelioration and to describe the conditions under which the fish and wildlife of the Illinois River Basin are attempting to survive.

>The

This report, then, is an effort to document water quality conditions existing today as related to fish and wildlife resources of the Illinois River Basin. → p 4

SUMMARY

The Illinois River Basin was at one time one of the finest fish and wildlife areas of this country. The Illinois River was a clear, beautiful stream that swept past hundreds of miles of timbered bottomlands and fertile lakes. These lands and waters were inhabited by a variety and abundance of fish, waterfowl, small game, big game, and fur animals.

However, land abuse, drainage, pollution, and extensive water re-use have reduced greatly the quality and quantity of the water resources in the basin. The fish and wildlife resources have suffered heavily from the resultant changes inflicted upon their natural environments.

Today, farmed uplands and diked and drained portions of the river bottoms are characterized by an almost complete lack of wildlife cover. Streams and lakes are extremely turbid, resulting in a loss of habitat and food for both fish and wildlife. Tremendous silt loads being deposited in the remaining flood-plain lakes continue to reduce the limited water area available to fish and wildlife. Chemical and organic pollution of the Illinois Waterway is so great and the water so intensively used that the production of aquatic vegetation and bottom-living organisms has been severely limited and reduced.

A severe reduction of fish populations in range and numbers has resulted from degraded conditions of the water and the habitat. Game species of fish, once widely distributed in the Illinois River Basin, have become uncommon to rare. The commercial fishing industry has been drastically reduced economically.

The loss of waterfowl habitat and a degrading of the quality of the remaining habitat has critically reduced the capacity of the flood plains to attract large numbers of migratory waterfowl. Lack of suitable cover is a limiting factor for upland game, including cottontail rabbits, bobwhite quail and squirrels. Many management problems exist that relate to water levels and water quality.

Fish and wildlife management by private and public agencies has been directed toward preservation and improvement of the remaining habitat and mitigation of losses suffered through the effects of drainage, pollution, water diversion, flood control and commercial uses of the waterway. Progress is slow in the latter category.

Forecasts of the population in the Illinois River Basin (11,700,000 in 1960) indicate that by 2010 the population will more than double. Types of recreation other than hunting and fishing will exert increasing pressure upon public areas. Although waterfowl hunting probably will not increase in proportion to the increase in population, a large increase in upland-game hunting is likely. Fishing pressure is likely to increase but depends upon available areas, available fish populations, and available time to spend in fishing.

INTRODUCTION

This report serves as an appendix to the Great Lakes-Illinois River Basin comprehensive study conducted by the United States Department of Health, Education, and Welfare. Topics covered in the report include the past and present distribution of more important fish and wildlife species, causes of the deterioration and loss of aquatic habitat, and principal management efforts aimed toward preserving and restoring that habitat.

The production and maintenance of the fish and wildlife of the Illinois River Basin are dependent upon water quality that is suitable for their existence. This report describes these criteria in relation to the needs, both present and future, of the aquatic wildlife of the Illinois River Basin.

Field investigations of wildlife areas have been made in an effort to determine the extent of degrading of the aquatic habitat by pollution, and also to determine and weigh methods of improving the existing habitat.

Data for the report were obtained through correspondence, personal communication with wildlife authorities and the public, and reviewing information from files and publications of earlier investigators. Although much of the data are concerned with the main channel of the Illinois River, supporting information is also included of the main tributary streams, lakes, and wildlife areas. A more detailed study of actual field conditions was not made because of a lack of available time necessary to conduct such investigations.

Grateful acknowledgement is extended to the personnel of the Illinois State Natural History Survey, Havana, Illinois; the State of Illinois Department of Conservation, Springfield, Illinois; and the United States Public Health

Service, Chicago, Illinois; for their assistance in providing valuable data. Recognition is also due to the many public-spirited citizens of the State of Illinois for their understanding and help in our quest for information.

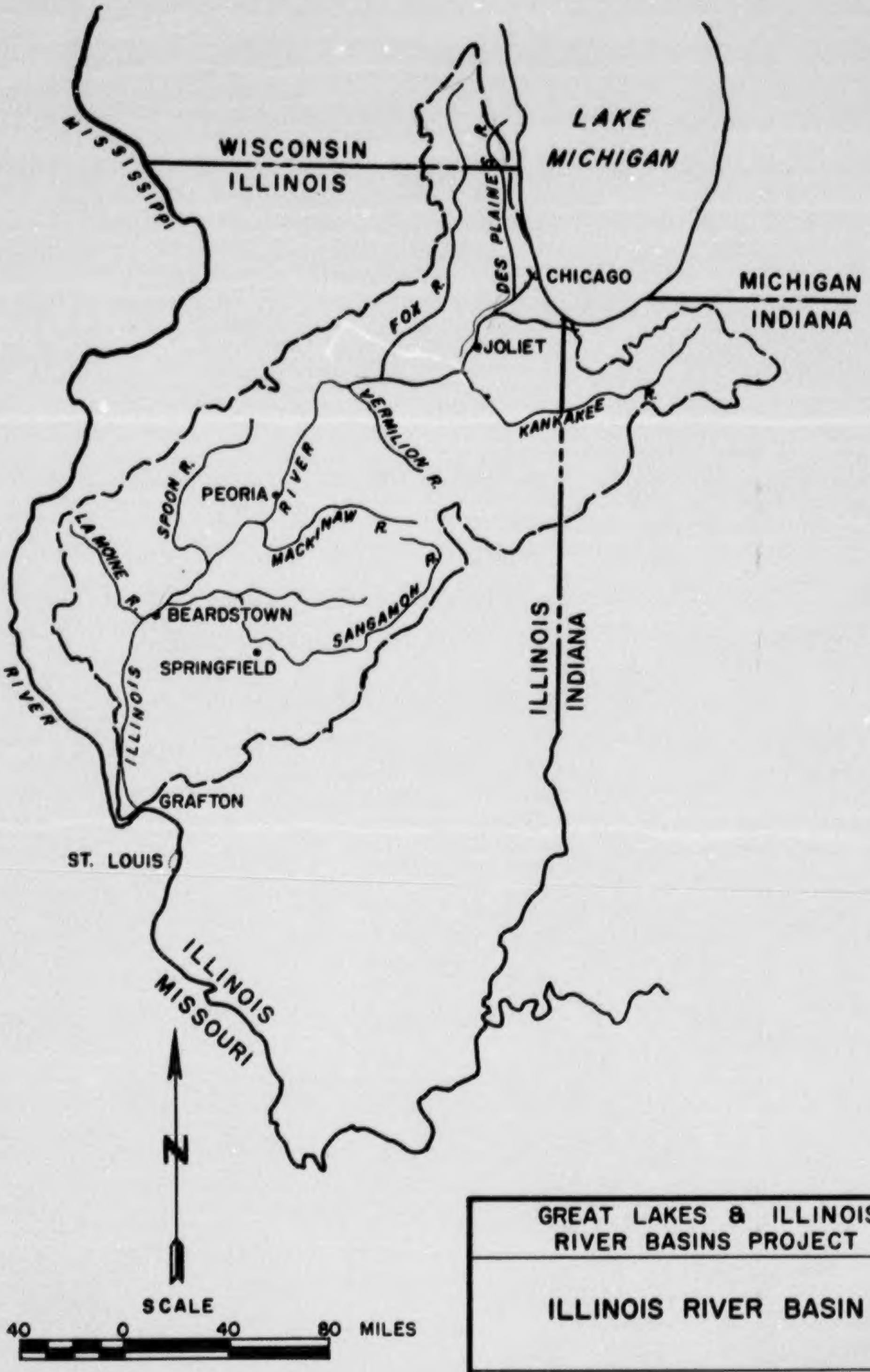
DESCRIPTION OF THE ILLINOIS RIVER BASIN

Since an adequate description of the Illinois River Basin has already been given in the main report of the Public Health Service, only a brief resume of points relating to the fish and wildlife of the basin will be presented in this appendix.

The drainage basin of the Illinois River encompasses approximately 29,000 square miles distributed over three states. The basin extends from the Des Plaines River drainage of southeastern Wisconsin to the Kankakee River drainage of northwestern Indiana. It includes the Chicago area of Lake Michigan and extends 327 river miles down to the confluence of the Illinois and Mississippi River at Grafton, Illinois. About 1,000 square miles are located in Wisconsin and 3,200 square miles in Indiana. The remaining 24,800 square miles are located in Illinois and represent about 40 per cent of the area of that state.

There are numerous tributary streams of the Illinois River, many of which have fair to good quality water during most seasons of the year. The map (Figure 1) illustrates the tributaries of most importance to the main river. For the purpose of this report, the most important tributaries are the Kankakee, Des Plaines, Fox, Vermilion, Mackinaw, Spoon, and Sangamon Rivers, since these streams are important as sources of game species of fish for the Illinois River.

The tributaries of the Upper Illinois River--the Des Plaines, Kankakee, Fox, and Vermilion--have cut deep troughs in the surrounding plains as they approach the Illinois. The tributaries of the lower Illinois--the Kickapoo, Mackinaw, Spoon, LaMoine, Sangamon, and Macoupin--have valleys


WISCONSIN
ILLINOIS
LAKE MICHIGAN
MISSISSIPPI
FOX R.
DES PLAINES R.
CHICAGO
MICHIGAN
INDIANA
JOLIET
VERMILION R.
KANKAKEE R.
SPOON R.
PEORIA
RIVER
LA MOINE R.
MACKINAW R.
SANGAMON R.
BEARDSTOWN
SPRINGFIELD
ILLINOIS
INDIANA
RIVER
ILLINOIS
GRAFTON
ST. LOUIS
ILLINOIS
MISSOURI
N
SCALE
40 0 40 80 MILES

GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

ILLINOIS RIVER BASIN

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

R.D.M. 630911

6a

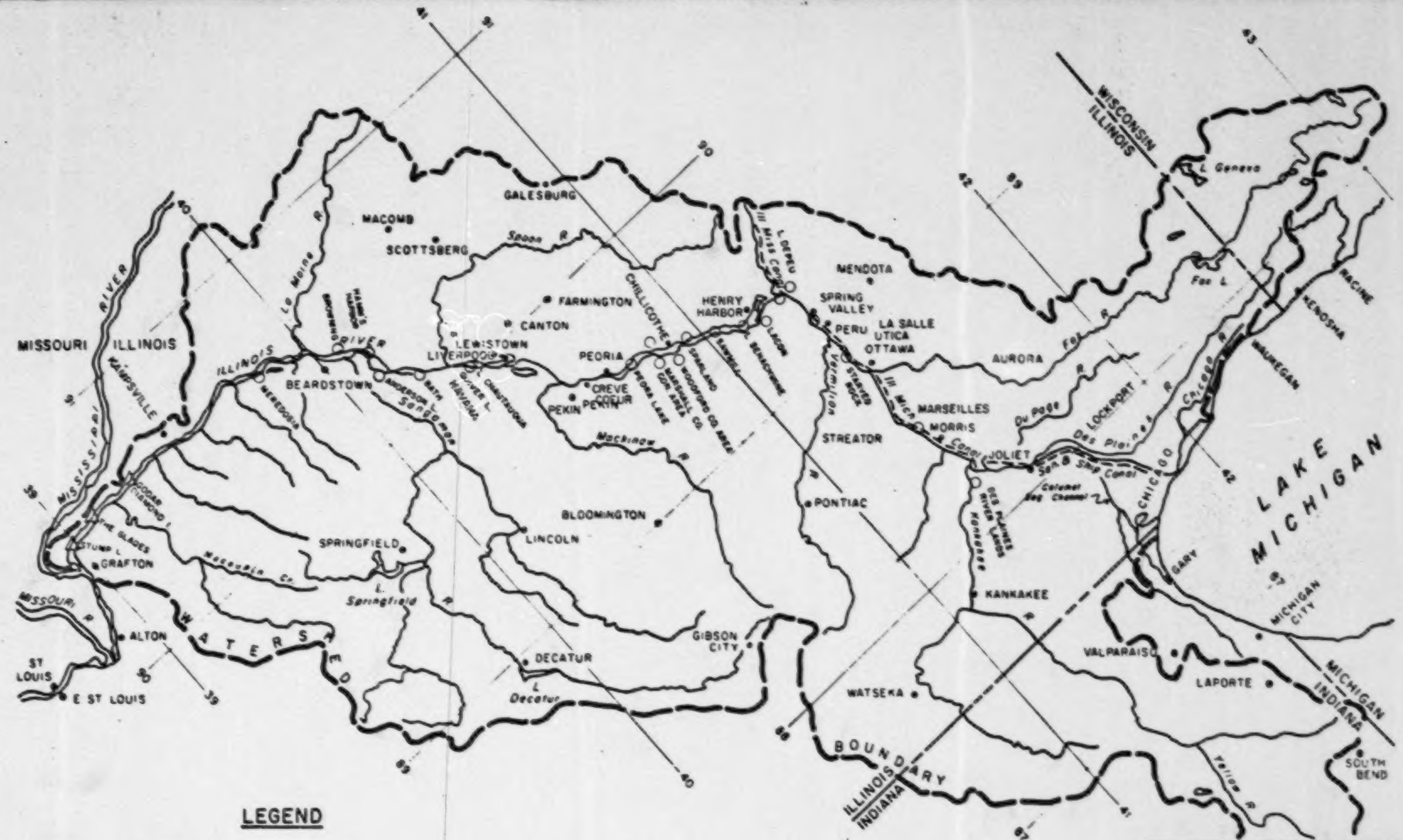
FIGURE 1

that are more distinct, with bluffs frequently bordering their courses. Sand or mud deltas at the mouths of some tributaries frequently make access from the main river channel difficult.

The lengths, drainage areas in square miles, and the average discharges for the more important tributaries to the Illinois River, are listed in Table 1. The discharge figures do not represent the flow of the particular stream at its confluence with the Illinois. The nearest gaging stations to the Illinois may be several miles from the river. However, the figures do give a general idea of the flows of each tributary. Boat launching sites, public fishing areas, and access sites (Figure 2) are widely distributed along the Illinois from Lake DePue in Bureau County to Fowler Lake in Jersey County. Many of the lateral lakes are heavily silted-in, resulting in a loss of storage capacity and reduction in available fishing area.

The fall of the Illinois is less than one-fourth foot per mile in its entire length from the junction of the Kankakee and Des Plaines to the mouth at Grafton. The stream is turbid over much of its length. It varies in width from 400 feet above LaSalle to 1,400 feet near Grafton.

Most of the Illinois River bottomland below LaSalle is divided into levee districts, with the levees paralleling the river. Upstream from LaSalle, river banks rise 10 to 20 feet above normal stages of the river. Further downstream at Havana the banks are less than 3 feet high.


WISCONSIN
ILLINOIS
L. Geneva
Fox L.
RACINE
KENOSHA
WAUKEGAN
LAKE MICHIGAN
Chicago R.
CHICAGO
GARY
MICHIGAN CITY
MICHIGAN
INDIANA
SOUTH BEND
LAPORTE
VALPARAISO
Yellow R.
Des Plaines R.
LOCKPORT
Du Page R.
Fox R.
AURORA
San & Ship Canal
Calumet Sag Channel
JOLIET
DES PLAINES RIVER LANDS
Kankakee
KANKAKEE
WATSEKA
BOUNDARY
ILLINOIS
INDIANA
MENDOTA
SPRING VALLEY
PERU
LA SALLE
UTICA
OTTAWA
STARVED ROCK
Ill. Mich. Canal
MARSEILLES
MORRIS
STREATOR
Vermilion R.
PONTIAC
L. DEPEU
Ill. Miss. Canal
HENRY
HARBOR
LACON
L. SENACHWINE
SAWMILL
SPARLAND
WOODFORD CO. AREA
MARSHALL CO. COR. AREA
PEORIA LAKE
CHILLICOTHE
PEORIA
CREVE COEUR
PEKIN
PEKIN
Mackinaw R.
BLOOMINGTON
GIBSON CITY
GALESBURG
Spoon R.
FARMINGTON
CANTON
LEWISTOWN
LIVERPOOL
CHAUTAUQUA
QUIVER L.
HAVANA
BATH
ANDERSON L.
Sangamon
BEARDSTOWN
MEREDOSIA
BROWNING
HAMM'S HARBOR
RIVER
ILLINOIS
La Moine R.
MACOMB
SCOTTSBERG
LINCOLN
SPRINGFIELD
L. Springfield
Sangamon R.
DECATUR
L. Decatur
Macoupin Cr.
WATERSHED
MISSOURI
ILLINOIS
KAMPSVILLE
MISSISSIPPI RIVER
DOGAR DIAMOND I.
THE GLADES
STUMP L.
GRAFTON
ALTON
MISSOURI R.
ST LOUIS
E ST LOUIS
41
91
90
42
89
43
88
40
87
39

LEGEND

△ · BOAT LAUNCHING SITES – PUBLIC FISHING AREAS

○ ACCESS AREAS – COOP. U.S. CORPS OF ENGINEERS AND BUREAU OF SPORT FISHERIES AND WILDLIFE.

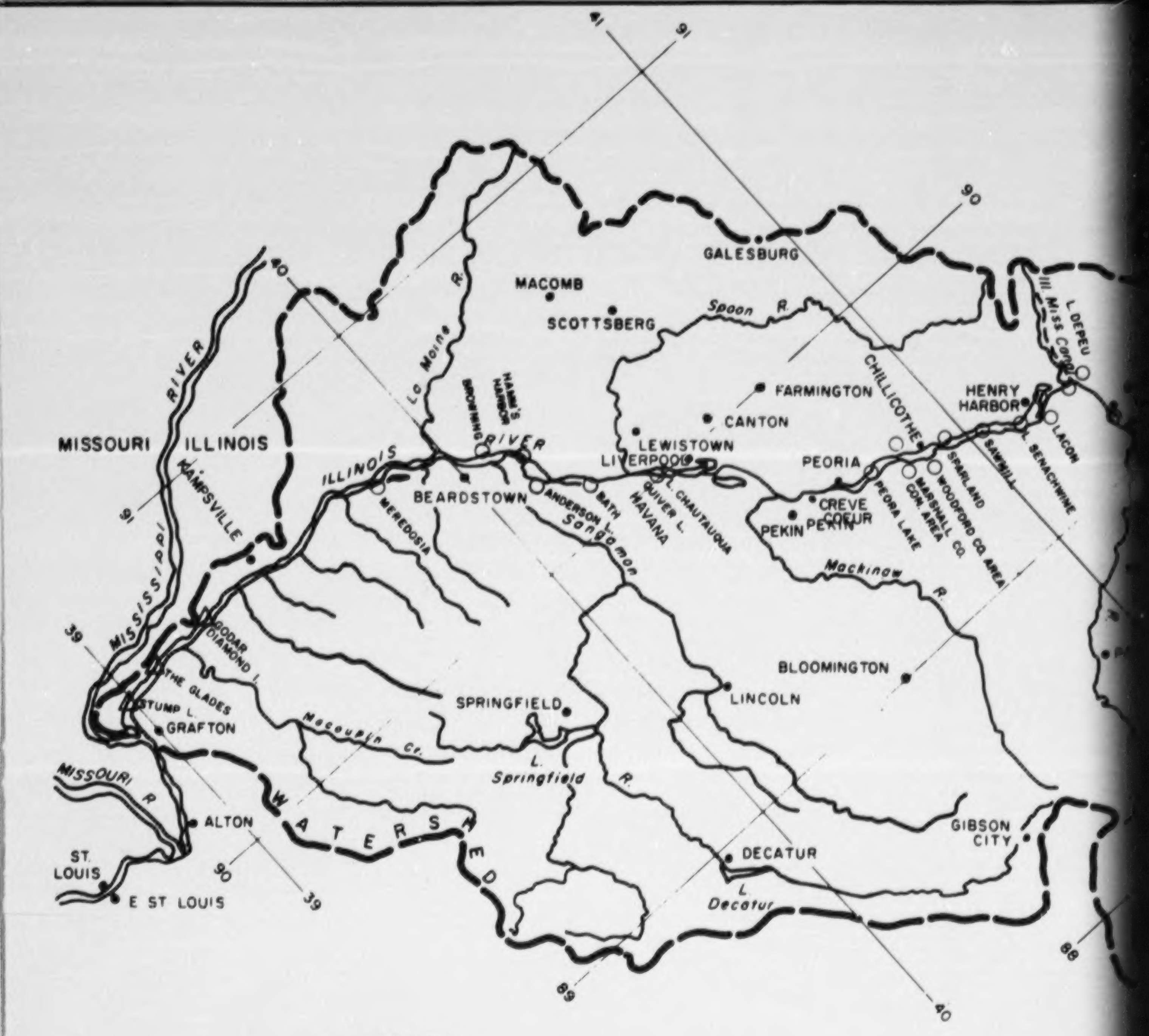
I.D.M. 630912

GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

BOAT LAUNCHING SITES, ACCESS
& PUBLIC FISHING AREAS OF THE
ILLINOIS RIVER BASIN

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

FIGURE 2



GALESBURG
MACOMB
SCOTTSBERG
Spoon R.
FARMINGTON
CANTON
LEWISTOWN
LIVERPOOL
CHILLICOTHE
L. DEPEU
Ill. Miss. Camp
HENRY HARBOR
LACON
L. SENACHWINE
SAWMILL
SPARLAND
WOODFORD CO. AREA
MARSHALL CO. CON. AREA
PEORIA LAKE
PEORIA
CREVE COEUR
PEKIN
Mackinaw R.
BLOOMINGTON
LINCOLN
GIBSON CITY
DECATUR
L. Decatur
Sangamon R.
L. Springfield
SPRINGFIELD
Macoupin Cr.
MISSOURI
ILLINOIS
MISSISSIPPI RIVER
ILLINOIS RIVER
La Moine R.
BROWNING
HARM'S HARBOR
BEARDSTOWN
MEREDOSIA
ANDERSON L.
BATH
HAVANA
QUIVER L.
L. CHAUTAUQUA
KAMPSVILLE
GODAR DIAMOND L.
THE GLADES
STUMP L.
GRAFTON
MISSOURI R.
ALTON
ST. LOUIS
E ST LOUIS
WATERSHED
41
91
90
40
39
89
88

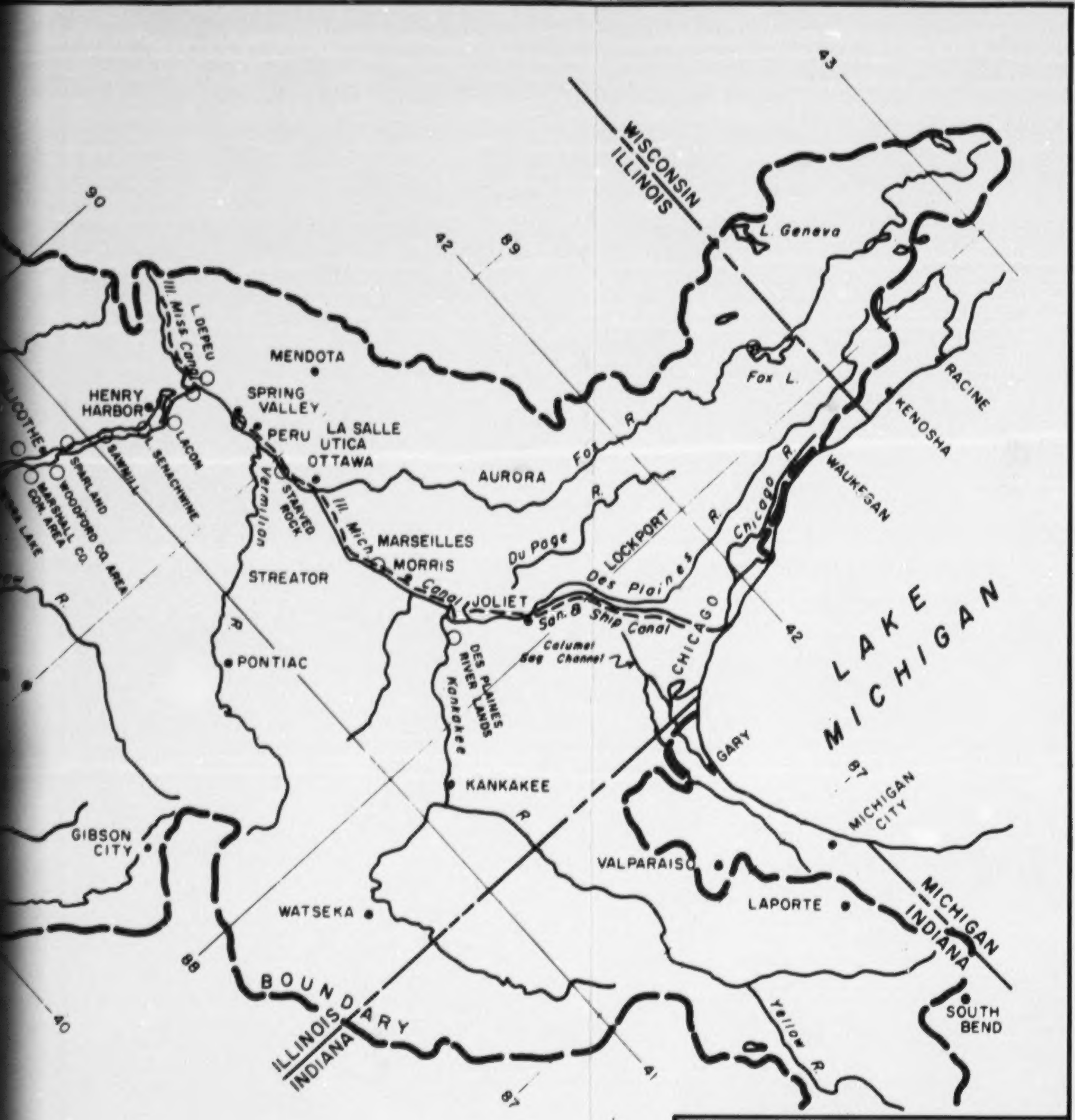
LEGEND

△ BOAT LAUNCHING SITES - PUBLIC FISHING AREAS

○ ACCESS AREAS - COOP. U.S. CORPS OF ENGINEERS AND BUREAU OF SPORT FISHERIES AND WILDLIFE.

A

R.D.M. 630912


WISCONSIN
ILLINOIS
43
90
42
89
L. Geneva
L. DEPEU
Ill. Miss Canal
MENDOTA
Fox L.
HENRY HARBOR
SPRING VALLEY
PERU
LA SALLE
UTICA
OTTAWA
LACON
L. SENACHWINE
SAWMILL
SPARLAND
WOODFORD CO. AREA
MARSHALL CO. CON. AREA
STARVED ROCK
Vermilion
Fox R.
AURORA
RACINE
KENOSHA
WAUKEGAN
Chicago R.
Du Page R.
LOCKPORT
Des Plaines R.
MARSEILLES
MORRIS
Ill. Mich. & Canal
JOLIET
STREATOR
San. & Ship Canal
CHICAGO
Calumet Sag Channel
42
LAKE MICHIGAN
R.
PONTIAC
DES PLAINES RIVER LANDS
Kankakee
GARY
87
KANKAKEE
R.
MICHIGAN CITY
GIBSON CITY
VALPARAISO
LAPORTE
MICHIGAN
INDIANA
WATSEKA
88
BOUNDARY
ILLINOIS
INDIANA
Yellow R.
SOUTH BEND
40
41
87

GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

BOAT LAUNCHING SITES, ACCESS & PUBLIC FISHING AREAS OF THE ILLINOIS RIVER BASIN

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

FIGURE 2

B

1

TABLE 1.

LENGTHS, DRAINAGE AREAS, AND FLOWS OF THE MAJOR TRIBUTARY STREAMS TO THE ILLINOIS RIVER

Tributary	Length (Miles)	Drainage Area (Sq. Miles)	*Av. Discharge (Cubic Ft. Per Sec.)
Kankakee	130	5,280	3,825
Des Plaines	111	1,366	214
Fox	185	2,600	1,493
Vermilion	110	1,379	739
Kickapoo	42	319	168
Mackinaw	112	1,200	455
Spoon	150	1,817	973
Sangamon	250	5,410	3,001
LaMoine	97	1,360	747
Macoupin	90	947	539

* Figures taken from Surface Water Records of Illinois, U.S. Geological Survey for 1961

Bottom-land lakes and ponds are connected to the river with access to them depending, much of the time, upon river stages. The lakes and ponds are heavily silted-in and do not maintain any degree of aquatic weed growth due to their turbid water conditions.

Practically the entire Basin has been glaciated. The lower reaches of the Basin are characterized by flat plains with deeply incised valleys; while in the upper reaches, there is a prevalence of rock bluffs. Land elevations on the bordering uplands average 750 feet and the stream valleys are some 200 feet lower. Soils are generally of excellent fertility although abused by intensive agricultural development and erosion. Bedrock and rock outcrops are sedimentary in origin, usually limestone.

The climate of the Basin is typical of the central United States; it features extremes in temperatures and moderate precipitation over the year.

FISH

The Distribution of Fishes of the Illinois River Basin

Past fish population studies of the Illinois River Basin indicated that four-fifths of all fish species recorded for the entire state were found in the Basin (1). Within the Basin lies a variety of lakes, ponds and streams that were reported as being typical of the waters of the state. Native fishes of the state not found in the Illinois River Basin are separated from it by climatic, geologic, or ecological barriers.

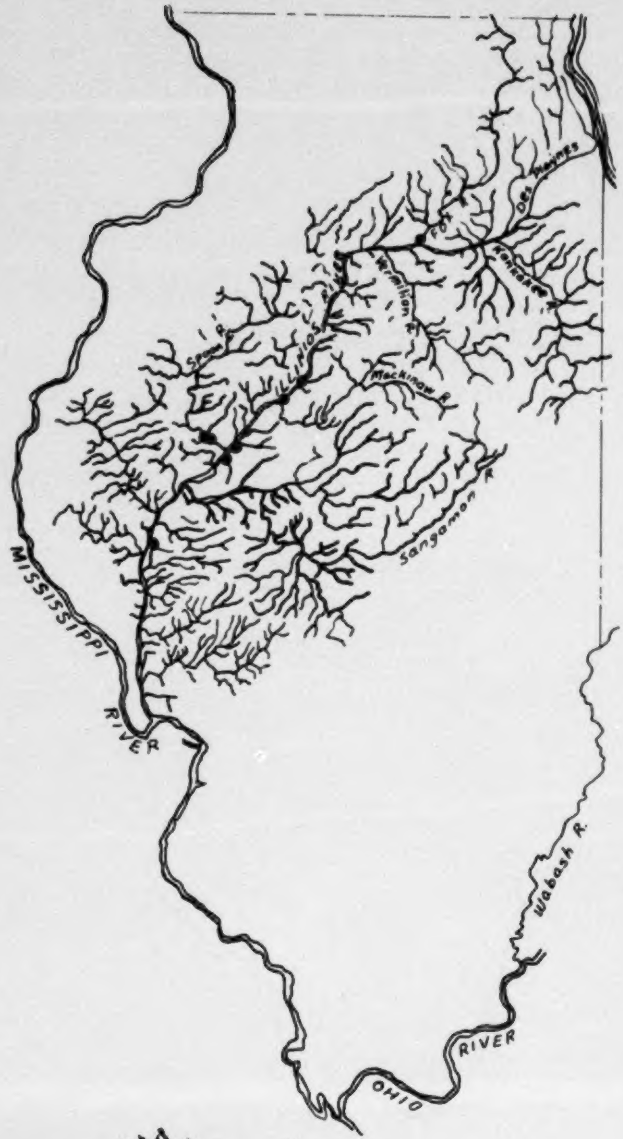
According to past investigations the Illinois River was rich in fish species. The then known number of species (1908) numbered 150 for the entire state (1). The total species collected in the Illinois River was 128. The figure probably has changed somewhat since then because the State species total has risen to over 170. However, the figure given for the river indicates a rich fauna and a varied one. It also indicates a needed, varied type of habitat, since the species list includes many fish preferring different ecological characteristics.

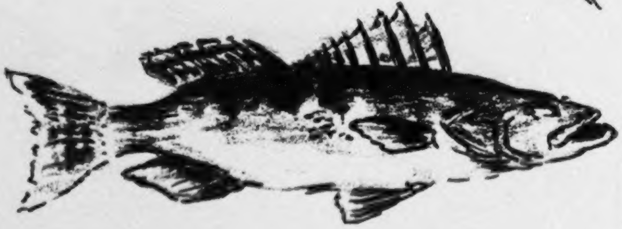
No known fish life occurred in the Illinois River north of Utica in 1920. Electrofishing in the Chicago Ship and Sanitary Canal resulted in no fish being seen in 1962. A few small carp and goldfish were taken in the North Shore channel by electrofishing, however.

Figures 3, 4, 5 and 6 are maps of the distribution of the four most popular game species of the Basin (2). Data for the maps were collected prior to 1919. However, distribution maps such as these may be misleading, since a dot might represent only one fish collected rather than many. Even if this is the case, it would appear that a wider distribution of the species shown occurred during early collection trips than at present. Present distribution of these species has changed considerably.

The upper reaches of the Des Plaines River above Lockport contain populations of largemouth bass, sunfish, crappies, northern pike, and carp. Below Lockport the Des Plaines is quite polluted, as indicated by the more pollution-resistant populations of carp and goldfish. Downstream movement of more desirable fish species is limited due to adverse water quality conditions.

The Fox River contains populations of walleyes and bass in its upper reaches in the lakes region. The desirable game species found in the upper reaches of the Fox do not move downstream into the Illinois in


Spoon R.
Illinois R.
Vermilion R.
Fox
Des Plaines
Kankakee R.
Mackinaw R.
Sangamon R.
MISSISSIPPI RIVER
Wabash R.
OHIO RIVER



GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

DISTRIBUTION OF THE WALLEYE

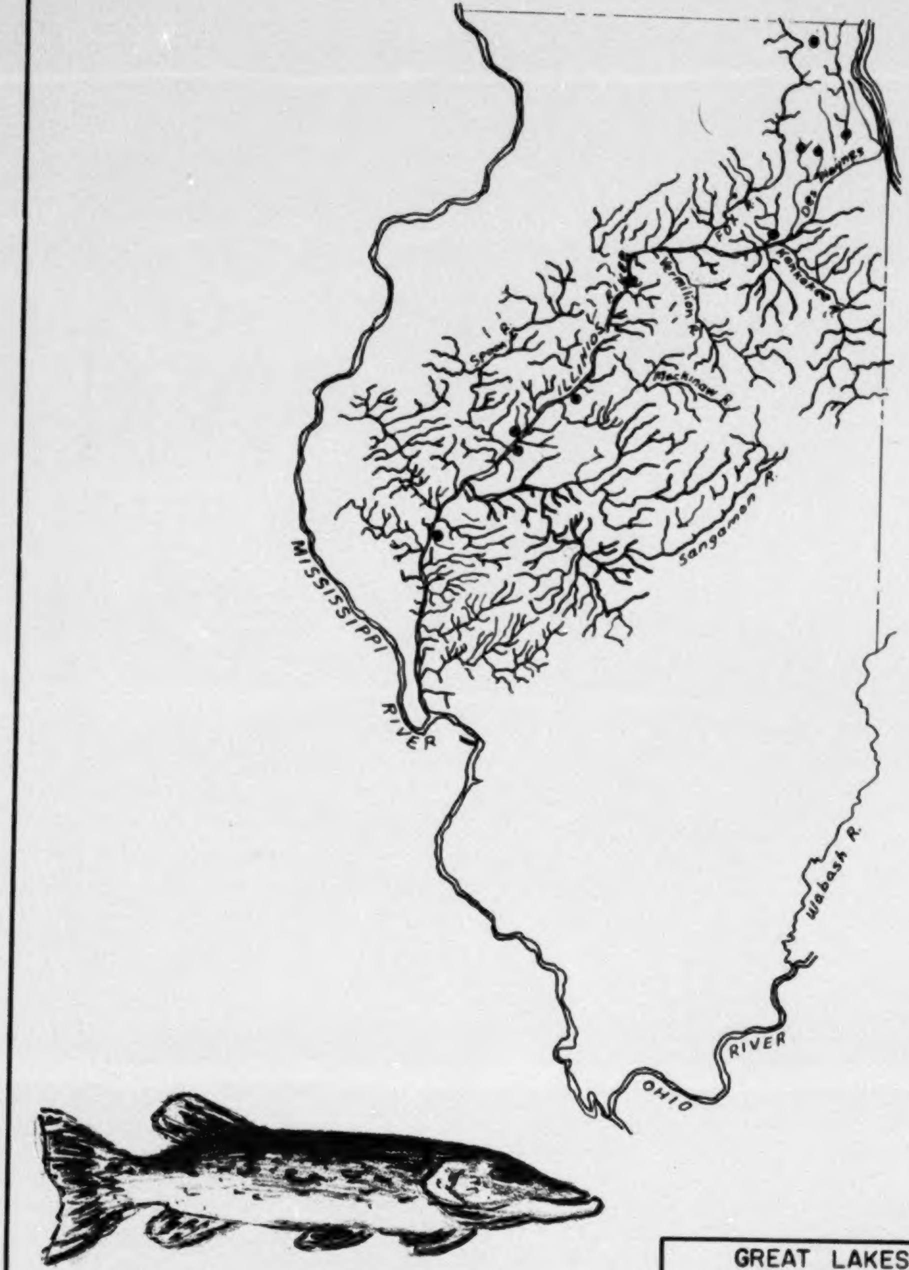
PRIOR TO 1919

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

R.D.M. 630912

10a

FIGURE 3


Des Plaines
Fox R.
Kankakee R.
Vermilion R.
Illinois R.
Spoon R.
Mackinaw R.
Sangamon R.
MISSISSIPPI
RIVER
Wabash R.
OHIO
RIVER

GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

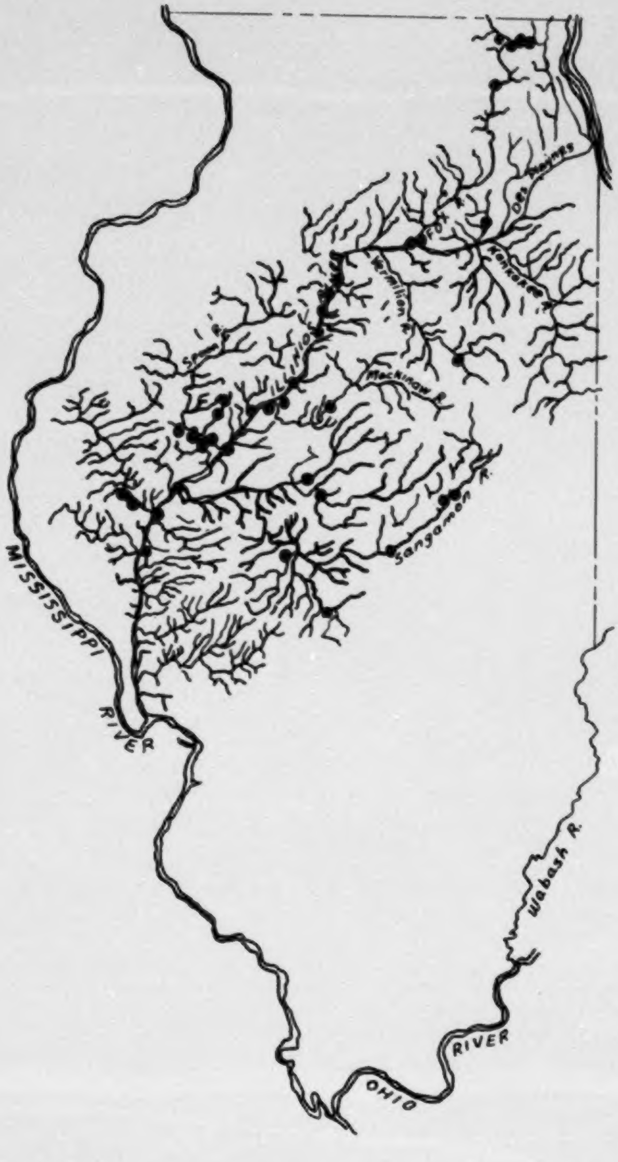
DISTRIBUTION OF THE
NORTHERN PIKE
PRIOR TO 1919

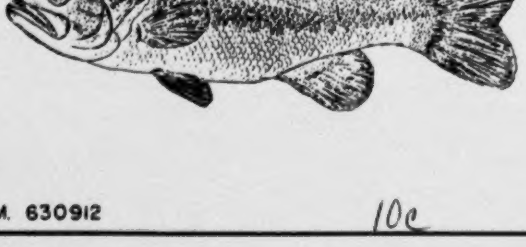
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

R.D.M. 630912

10b

FIGURE 4


Des Plaines
Fox
Kankakee
Vermilion R.
Spoon R.
ILLINOIS
Mackinaw R.
Sangamon R.
MISSISSIPPI RIVER
Wabash R.
OHIO RIVER



GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

DISTRIBUTION OF THE LARGEMOUTH BASS

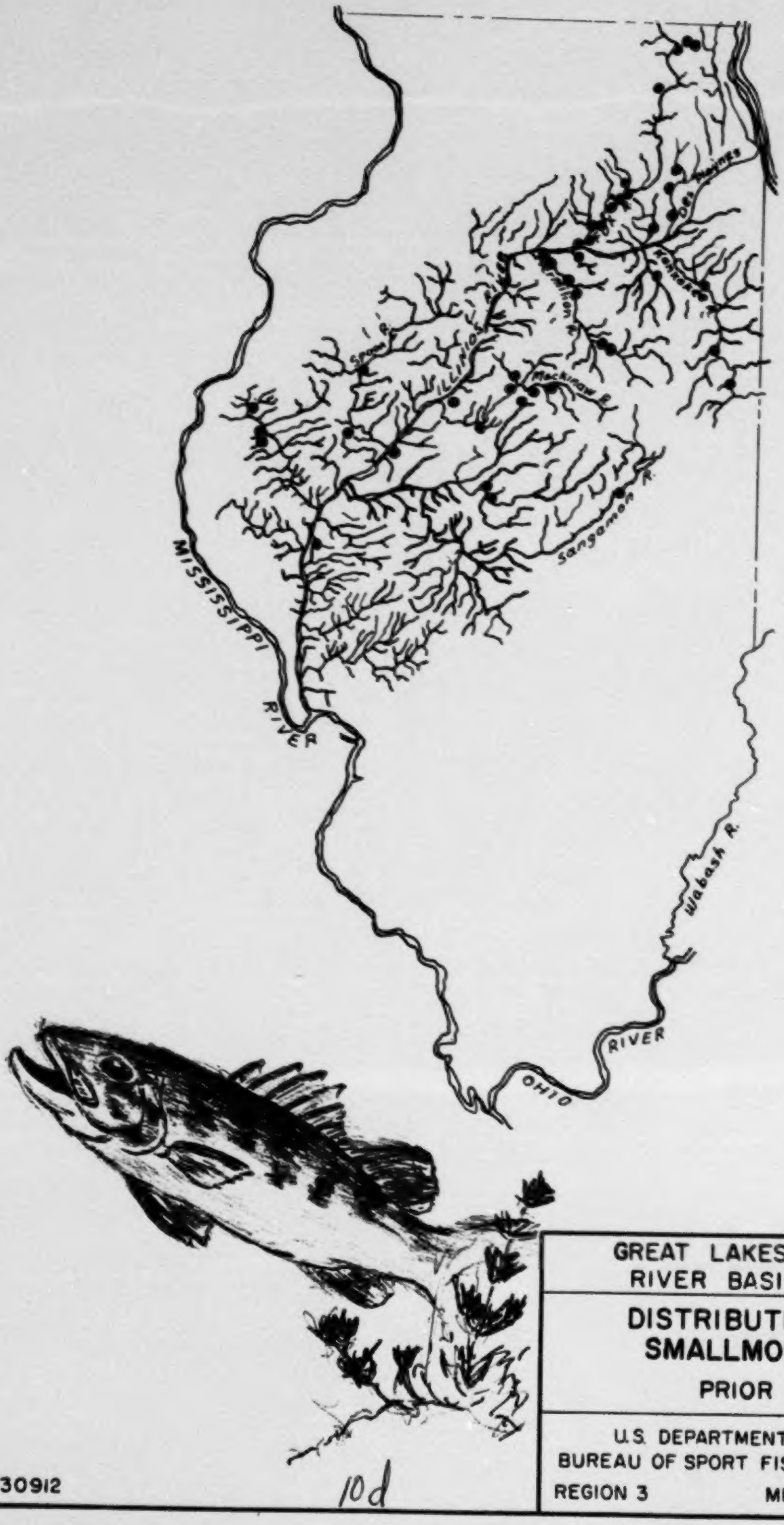
PRIOR TO 1919

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

R.D.M. 630912

10c

FIGURE 5


Des Plaines
Kankakee R.
Vermilion R.
Illinois R.
Spoon R.
Mackinaw R.
Sangamon R.
MISSISSIPPI RIVER
Wabash R.
OHIO RIVER

GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

DISTRIBUTION OF THE
SMALLMOUTH BASS
PRIOR TO 1919

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

R.D.M. 630912

10d

FIGURE 6

significant enough numbers so as to produce a fishery. Downstream movement is limited by polluted conditions existing in the lower reaches of the Fox River. The Fox is potentially a good sucker stream, particularly in that region below the lakes area. Channel catfish found in the main channel of the Illinois in the vicinity of Ottawa have probably moved down from the Fox.

The upper reaches of the Spoon and Sangamon Rivers contain populations of smallmouth bass and rock bass. However, these desirable species do not enter the Illinois because of adverse water quality conditions.

In the entire length of the Illinois River, northern pike are considered extremely scarce. Past studies of northern pike range in the Illinois revealed that its disappearance coincided with the disappearance of the marsh areas. Water quality was not considered as being involved. Reports of northern pike being taken have proved, upon examination, to be the mud pickerel, a smaller member of the pike family that does not reach desirable lengths. It is not a sought-for species.

Rock bass are scarce in the Illinois River. The species has been mistaken for the warmouth, a less desirable game fish. The Illinois River in the vicinity of Liverpool contains a fair population of warmouth.

The smallmouth bass is also scarce in the Illinois with no recent collections being made below Henry in Marshall County.

The largemouth bass is found generally in the Illinois River from below Starved Rock in LaSalle County to the mouth of the river at Grafton.

Concentrations of largemouth bass are found in areas containing brush and other forms of shelter. Destruction or removal of natural fish shelters by ice or high water has been responsible, in some areas, for the loss of crappie and largemouth bass habitat. With the loss of habitat, the desirable fish populations leave.

Crappies are taken from most of the lateral lakes, as well as the Illinois River from Spring Valley downstream. River fishing for crappies is done almost wholly by local fishermen. Crappies are scarce in the Marseilles pool because of adverse water quality conditions. The existing environment is conducive to bullheads, so that it is now classified as a bullhead pool.

The walleye is extremely scarce in the Illinois River with none being taken in recent field collecting trips made by the Illinois Natural History Survey. However, commercial fishermen occasionally take a walleye during netting operations around Starved Rock.

Commercial Fishes

Commercial species of fish found in the Illinois River include: carp, buffalo, freshwater drum, channel catfish, bullheads, shovelnose sturgeon, suckers, mooneyes, bowfin, American eel, and carpsuckers. Abundance of these species, as with sport fishes, is dependent upon several factors, among which are water quality conditions and changing ecological characteristics of the environment.

The preponderance of commercial and rough species of fish in the river over pan and game fishes supports the fact that a degraded environment exists and that the more pollution-sensitive species of fish do not remain in adverse environments. The number of species of all fish, rather than the presence or absence of a single species, is more reliable as an indicator of the degree of pollution existing in a given situation.

The changing habitat, degrading of water quality, and shifting of the environment from a favorable to an unfavorable one, can be considered as a few of the primary reasons that the fish fauna has been reduced. The ranges for pollution-intolerant species have been so reduced that pollution tolerant species have become the dominant ones in many areas. Under the present poor water quality conditions existing in the Illinois River, it is to be expected that fish distribution will continue to be seriously affected and severely limited. A list of the species of importance in the Basin is given in Table 2.

Sport Fishes

Most sport fishing in the Illinois River Basin is carried on in bottomland lakes, although there is considerable activity in the Illinois River. Fishing methods vary according to local customs and for the species sought. In the lower reaches of the Illinois River good bluegill fishing exists in the main river channel and lateral lakes. At Grafton, near the confluence of the Illinois and Mississippi Rivers, good bluegill fishing is found in lateral lakes. Good sport fishing on hook and line for bass, bluegills, and crappies exists around Browning, upstream from Grafton. Successful fishing is also found at Long Lake near Browning.

TABLE 2.

FISH SPECIES OF IMPORTANCE IN THE ILLINOIS RIVER BASIN

Commercial	Game **
Carp	Largemouth bass
Buffalofishes	Smallmouth bass
Drum	*Crappies
Catfishes	Warmouth
Bullheads	Bluegills
Shovelnose sturgeon	*Channel catfish
Suckers	*Bullhead
Bowfin	White bass
Paddlefish	Yellow bass
Carpsucker	*Yellow perch
Crappies	*Flathead catfish
Gars	Suckers
Eel	

* May be taken commercially under special regulations

** Game species denotes a category of fish most often referred to as such in fishing guides and the like. In some regions, however, the carp may be classed as a game species by local fishermen who prefer the carp over other fish.

Beardstown Bay produces good catches of bluegills and crappies and supports both sport fishing and commercial fishing. Some tension exists between the sport and commercial fishermen over use of commercial gear in the taking of fish in the bay. Local sport fishermen claim the area is being ruined by commercial fishing activities. Back areas of the bay, once preferred fishing areas for crappies and bluegills, are being lost because of filling by siltation. The choice of bait and methods of fishing are important in this area for a successful creel. According to a local bait dealer, a few fishermen from the Peoria and Chicago areas come to Beardstown for panfish angling.

Electrofishing investigations by the staff of the State Natural History Survey indicate that good reproduction of game species in the Illinois River is found above Peoria at Spring Valley. Spring Valley was the first station where largemouth bass and crappies began to appear regularly during electrofishing collections.

Fishing is the Marseilles Pool north of Peoria is mainly for black bullheads. Sport fishermen contacted in this area report fairly good crappie fishing in the spring and fall, but complain of small bullheads. Reproduction of bullheads in this section is good,as many schools of fingerlings have been seen in the spring.

According to personnel of the State Natural History Survey at Havana, Illinois, the rate of growth is good in all fish of the Illinois River except the carp.

The State Natural History Survey conducted a comprehensive survey at Lake Chautauqua to determine the sport and commercial values of the lake, develop management practices in an effort to increase the yield, undertake biological surveys, and estimate the dynamics of the fish population. The study revealed that fishing success at Chautauqua was affected by water level fluctuations, seasons of the year, and relative abundance of the several species present in the lake (3).

Generally, fishing success declined during both years of the study when water levels were falling. In only one species, the largemouth bass, was fishing better during that period when water levels were falling, or were at a low stable storage.

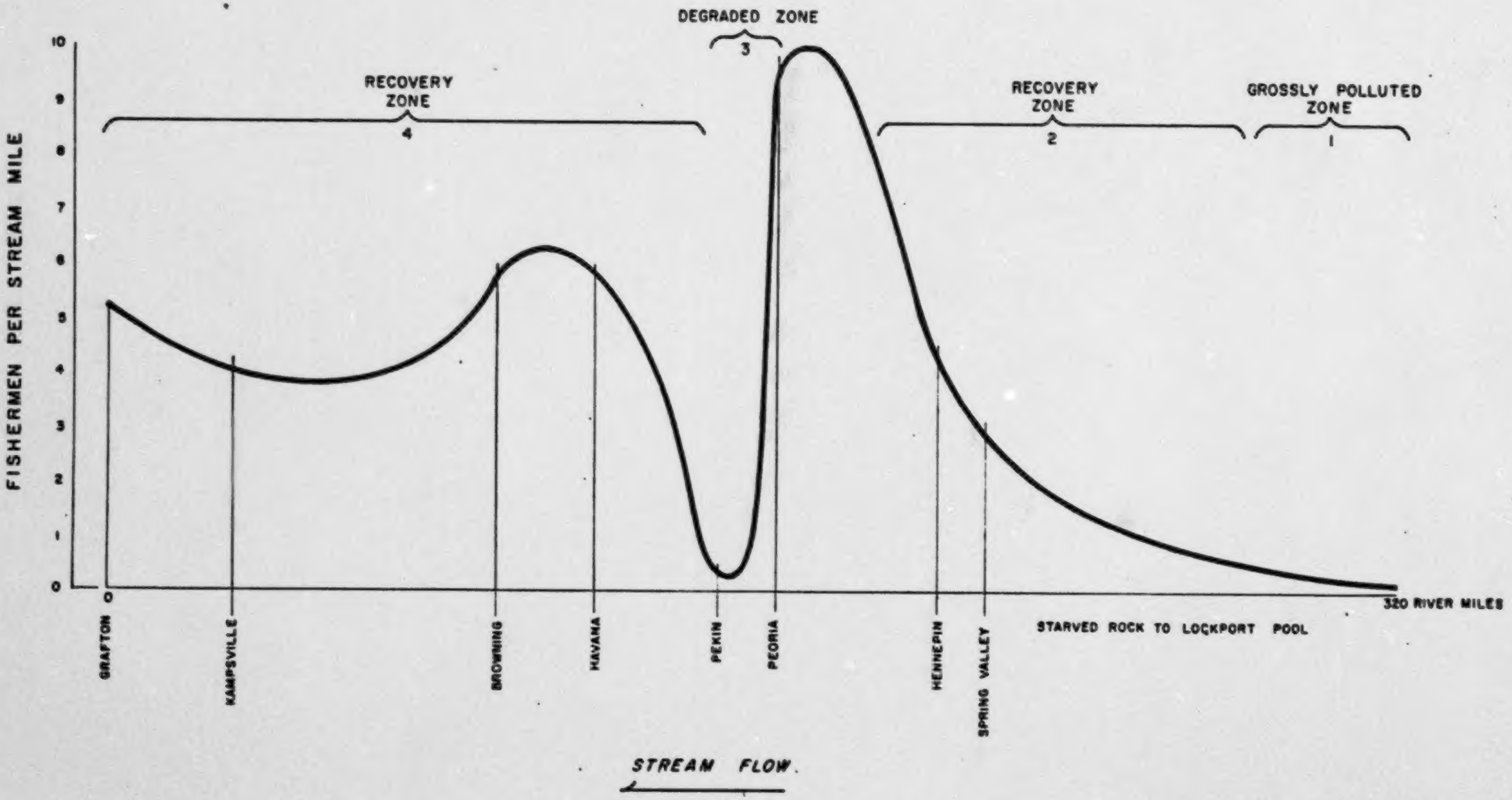
Fishing success varied as to seasons of the year. Crappies, a much sought species, were taken more readily during the fall, winter, and early spring. Catches fell off during the warm summer months. Yellow bass were more readily taken during early spring also. The white bass and bluegill were taken in greater numbers during summer and late spring and summer, respectively.

Creel census data, covering a period of 2 years (1950-1951) revealed that the harvest of sport fishes would have been greater had the anglers known how to fish for them and how to fish the lake. Methods of fishing for various species of fish were described in the survey in an effort to acquaint the fishing public in how to successfully fish the lake (3). It is interesting to note that natural bait, recommended in this area, was also the recommended bait in the Beardstown area several miles downstream. In silt-laden waters fish apparently must find bait by smell rather than sight, thereby making the natural bait the most successful used.

Fishing pressure on the Illinois River varies under several circumstances. Proximity to metropolitan centers, access to the river, knowledge of preferred fishing areas, and water quality conditions are some of the factors deciding the number of fishermen to be found in any one location. Estimates of the numbers of fishermen per stream mile vary according to the factors previously mentioned. Figure 7 shows a rough estimate of numbers of fishermen per stream mile from the Des Plaines River at Joliet downstream to Kampsville, Hardin, and Grafton. The estimates are based upon sight observations.

The line graph covers an area of approximately 290 stream miles. It does not include fishermen use in back or lateral water areas. The estimates are based upon the fishermen seen on week days and are judgment values only. It is of interest to note that information from the Public Health Service on degrees of pollution along the river closely resembles the data on fishermen per stream mile. The data from the Public Health Service is included: . . . (1) there is no fishing above Lockport because of grossly polluted waters . . . (2) recovery begins above Peoria, then gets a "slug" of pollution at Peoria . . . (3) water quality is retarded for the next 50 to 60 miles before recovery begins again. The data above appears as encircled figures in the line drawing.

The bass fishing potential of the Illinois is great but is not utilized. There is concern that an apathy seems to exist that is decreasing the use of the fishing resource of the basin. Speed boating, water skiing, and boat "joy riding" appear to be of greater recreational value than fishing insofar as the public is concerned.



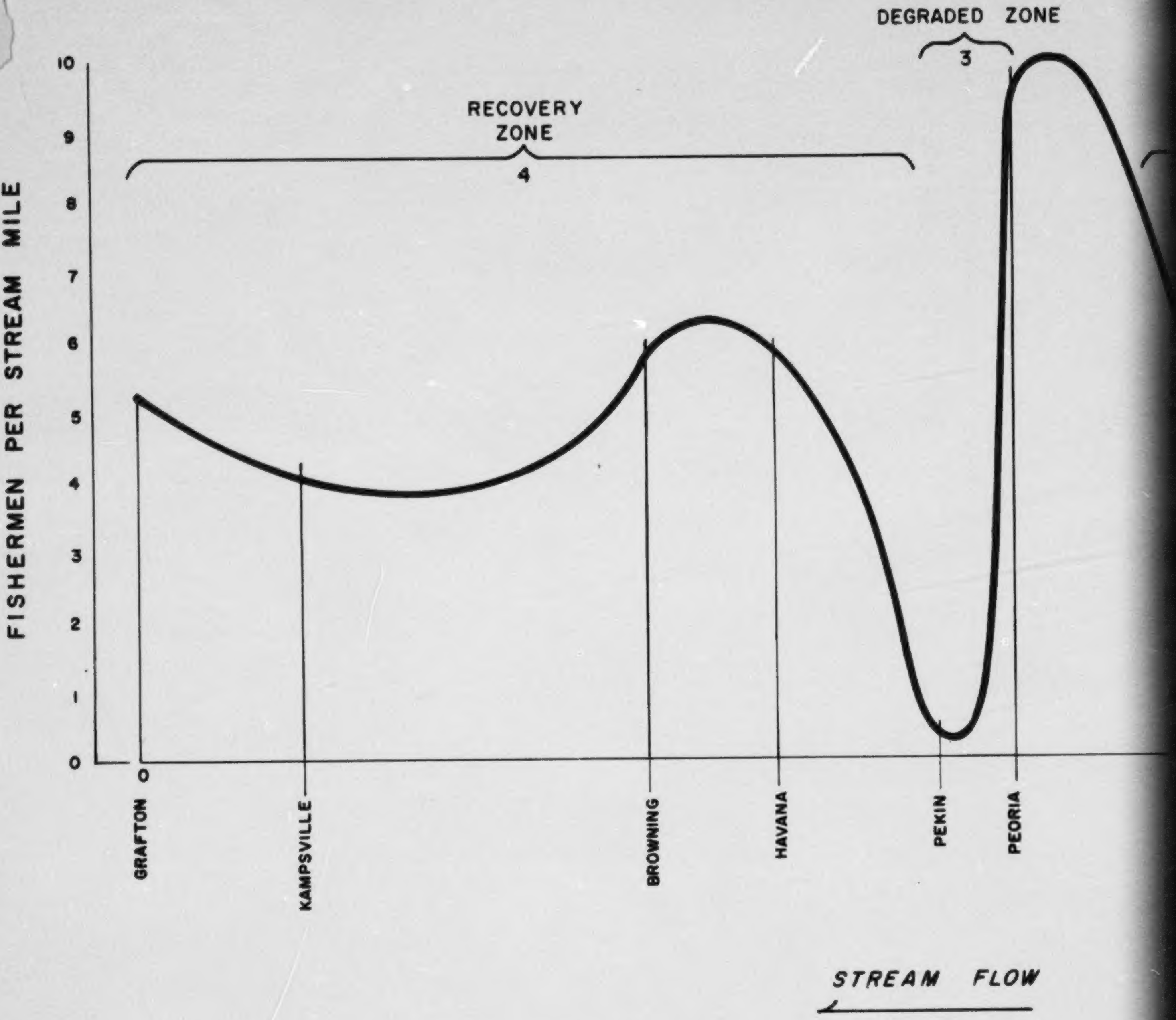
GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

ESTIMATED AVG. NO. OF FISHERMEN PER STREAM MI. AS RELATED TO POLLUTION ZONES ALONG THE ILLINOIS RIVER

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

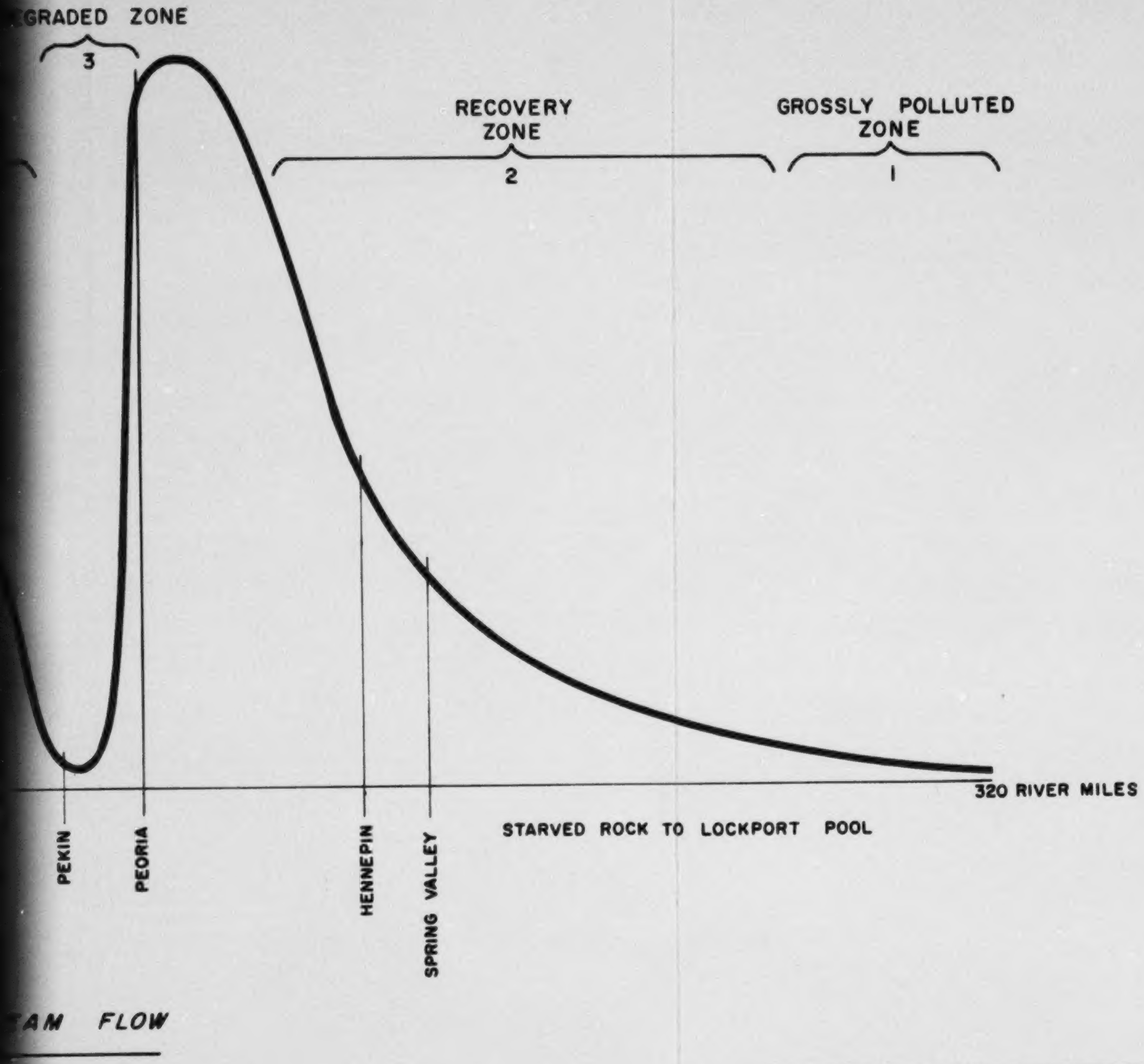
R.D.M. 631010

17a


DEGRADED ZONE
3
RECOVERY ZONE
4
FISHERMEN PER STREAM MILE
10
9
8
7
6
5
4
3
2
1
0
0
GRAFTON
KAMPSVILLE
BROWNING
HAVANA
PEKIN
PEORIA
STREAM FLOW

A

R.D.M. 631010



B

GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

ESTIMATED AVG. NO. OF FISHERMEN PER STREAM MI. AS RELATED TO POLLUTION ZONES ALONG THE ILLINOIS RIVER

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

FIGURE 7

Fisherman access is not a problem on the Illinois River. The entire river length, from Brandon Locks and Joliet to the mouth of the river at Grafton, is open at numerous points. These points include access for bank fishermen from roads, bridges, and State public access sites, as well as boat ramps for launchings at many private areas, State boat ramps, and municipally owned ramps such as at the Town of Chillicothe. Paralleling the river, particularly through the lower reaches, there are numerous public fishing lakes readily accessible by boat from the river. Many of the flood plain backwater lakes that were adjacent to the river have been leveed and are now being farmed. If they were ever returned to their natural ecological state, they would provide good fishing waters.

Extent of Present and Future Use

The fishery of the Illinois River Basin is not being utilized to its fullest potential. Although considerable fishing activity exists in the Basin, most use is made of the lateral lakes and bays. Expected heavy fishing pressure is to be found in areas of high population densities.

Past studies indicated that 10 man-days of fishing per acre per year was a conservative estimate of use made of State-regulated fishing areas. The warmer 6 months of the year accounted for about 75 per cent of all fishing activity (4). The State of Illinois maintains several lakes and preserves on the Illinois River and its tributaries that make available thousands of acres of fishable water. Many of these areas are relatively shallow, averaging less than 6 feet in depth. However, they do provide good fishing opportunities and produce good populations of pan fish regardless of their shallow basins.

A slight recovery of the river from the effects of pollution upstream is seen at Peoria. Peoria Lake has some fishing pressure but this pressure falls sharply to almost nothing a few miles downstream at Pekin. Fishing pressure is extremely low in this area. Environmental changes brought about by habitat destruction from adverse water conditions or from direct and indirect effects of pollution directly affects the distribution of fish. This distribution, when adversely affected, has a direct bearing upon use of the area for fishing.

The Fox River has numerous fishing camps along its banks several miles above Wedron, on the Illinois River. This section of the Fox has light fishing pressure for channel catfish and crappies. Heavier pressure is found farther upstream in the Chain-O-Lakes region.

A creel census investigation tabulated over 10,000 fishermen days on Lake Chautauqua during 1950 and over 13,000 fishermen days in 1951. The census also revealed that more than 80 per cent of the anglers in 1950 and 1951 drove distances of 25 miles or more to fish the lake. Lake Chautauqua also supports good catches of yellow bass during periods of high water and in the winter. Estimates of the numbers of ice fishermen at Chautauqua run as high as 300 per day on holidays. Ice fishing at Anderson Lake is also important. Estimates of ice-fishermen day use at Anderson Lake show heavier pressure than at Chautauqua.

More recent studies of fishing pressure at Lake Chautauqua revealed than an average distance traveled by fishermen was about 80 miles round trip.

The number of anglers varied from 5,600 to over 13,000 per year. Although most of the out-of-state anglers did not come to Chautauqua to fish, a few anglers did drive from the metropolitan area of Chicago for the purpose of fishing the lake (5).

Fishing pressure is sporadic around the Browning-Beardstown-Grafton area, since use depends somewhat on the water conditions during the summer months. Although creel census records have not been taken, contact with local fishermen and bait dealers in the lower reaches of the Illinois resulted in a good estimate of fishermen use. Lateral lakes, tributaries, and bays in the lower Illinois are fished by a few people from the St. Louis metropolitan area. However, investigations show that few fishermen travel over 50 miles to fish areas of the Illinois basin. A few fishermen come from as far away as Chicago, but these are the more successful anglers who have knowledge of the area as well as the local fish populations available.

Unfortunately, the majority of the lateral lakes that provide fishing opportunities are not close to centers of heavy population densities. Additional areas should be provided in order that recreational facilities can be made more available to more people.

Population figures for the year 1910 through 1960 show a tremendous increase for the Illinois River Basin. The following list shows the total population of the Illinois basin covering the period 1910 through 1960, and the projected population 50 years hence:

1910	4,231,000
1940	6,566,300
1950	7,427,300
1960	8,944,000
2010	18,615,000

It can be seen that in 50 years the population of the Basin will more than double. Since present recreational facilities are described as inadequate, the future fishing opportunities are in a critical position.

A review of the license sales for the Illinois River Basin (Table 3) indicates a sharp reduction in sales since 1955. The greatest reduction in sales occurs in Cook and Peoria Counties.

However, regardless of this drop in license sales (more than 100,000) the Illinois Basin still produces over 235,000 potential fishermen. If the increase in the number of fishermen is commensurate with the increase in population, a potential of 470,000 fishing licenses, or fishermen, would use the facilities of the Illinois River Basin by the year 2010. This rough estimate is probably too high because the trend since 1955 is downward in the number of licenses sold in almost all areas of the Basin.

A recent study of sport fishing in the nation for the present and future indicated that construction of new fishing areas is not likely to keep pace with the projected national population. The study also revealed that an improvement in water quality of major streams is important to those states bordering the streams. The improvement discussed in the study included pollution abatement, rough fish control, erosion and siltation control, and the control of aquatic vegetation in special situations (6).

TABLE 3. SUMMARY OF FISHING LICENSE SALES FOR COUNTIES OF THE ILLINOIS BASIN 1950-1955-1960

County	1950	1955	1960
Brown	919	937	705
Bureau	5,630	6,480	4,296
Calhoun	2,739	4,013	2,662
Cass	2,173	2,513	1,855
Cook	191,485	199,694	123,529
DuPage	7,973	8,832	7,362
Fulton	7,324	7,399	6,324
Green	2,678	2,673	2,526
Grundy	2,629	3,033	2,573
Jersey	5,018	3,962	3,660
Kendall	1,460	1,557	1,299
LaSalle	15,435	17,940	12,863
Marshall	1,691	2,417	1,526
Mason	4,420	4,829	3,841
Morgan	5,118	5,099	3,840
Peoria	22,547	24,592	18,945
Pike	5,391	5,665	5,364
Putnam	640	729	572
Schuyler	1,336	1,335	1,297
Scott	1,004	1,028	799
Tazewell	11,327	14,644	13,107
Will	13,595	18,467	14,498
Woodford	1,950	2,855	2,026
TOTALS	314,482	340,963	235,469

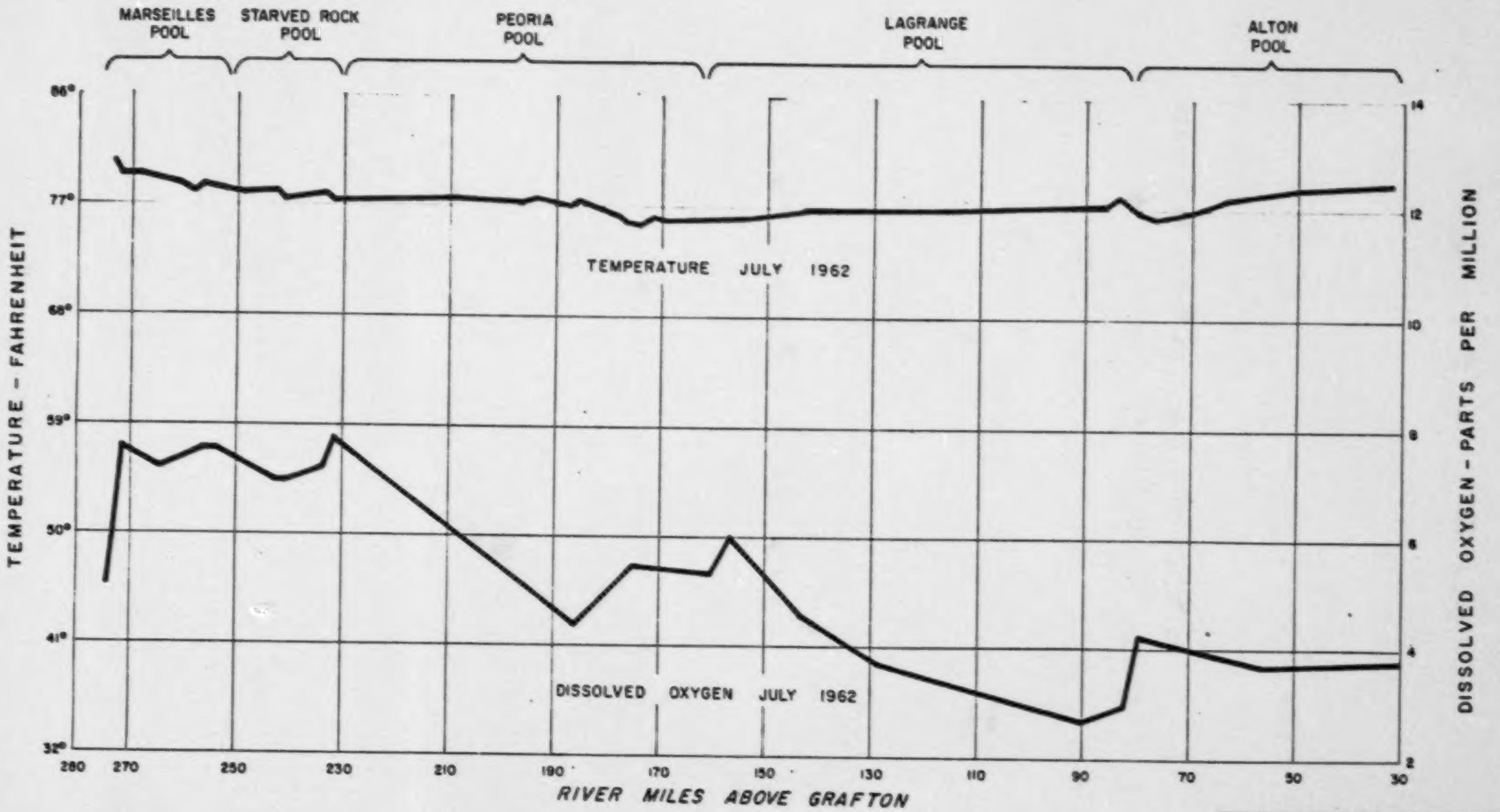
The findings of this study, although national in scope, are applicable to the streams of the Illinois River Basin.

Oxygen determinations have been made of the entire Illinois River at selected sampling sites at selected seasons of the year. The amount of dissolved oxygen fluctuated most during July, which is to be expected. Plotting the July 1962 dissolved oxygen determinations along the course of the river from mile 290 to its mouth, brings to light several interesting facts as shown in Figure 8.

The high points of the line drawing represent high oxygen determinations at the locks and dams along the river length. The increases in dissolved oxygen are found immediately below each lock and dam. Levelling off and decreases are found in each pool below each lock. Re-aeration of the river apparently occurs immediately below each lock. Temperatures do not fluctuate materially so that the effect of temperature upon the amount of dissolved oxygen in any given situation appears to be negligible.

Although dissolved oxygen levels dip to a low of slightly less than 3 parts per million, the average dissolved oxygen content of the water does not reach lethal limits. Past investigations involving oxygen deficiencies in other areas indicate that fish movement into and out of areas of borderline oxygen deficiencies prevent any large fish kills from occurring.

Dissolved oxygen determinations for the spring and late fall months are considerably higher than in the summer months. Water temperatures, being somewhat cooler during spring and fall, characteristically are able to hold more dissolved oxygen in solution than the warmer waters of summer.



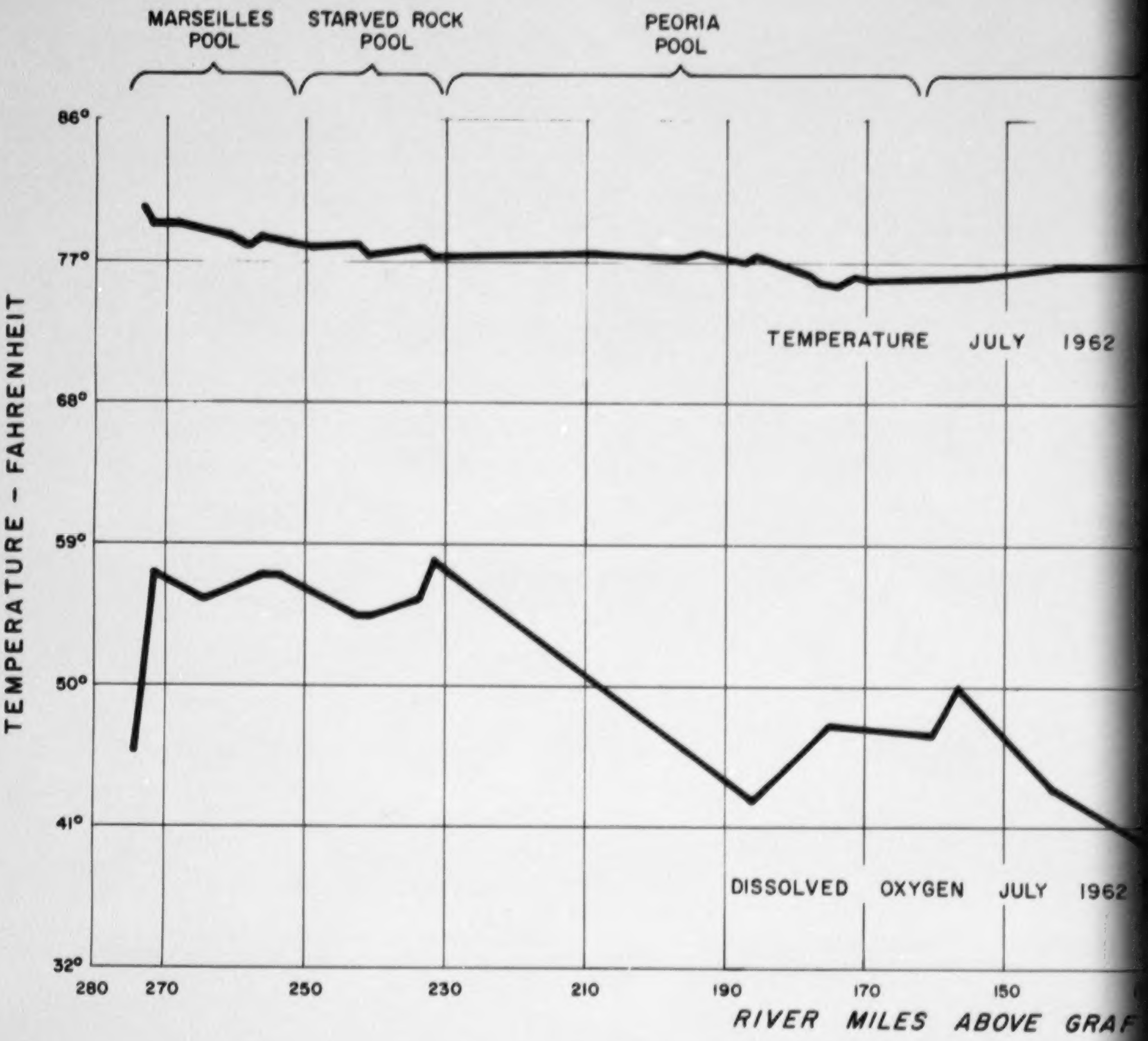
GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

D. O. DETERMINATIONS &
TEMPS. IN THE VICINITY OF
LOCKS ON THE ILLINOIS RIVER

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

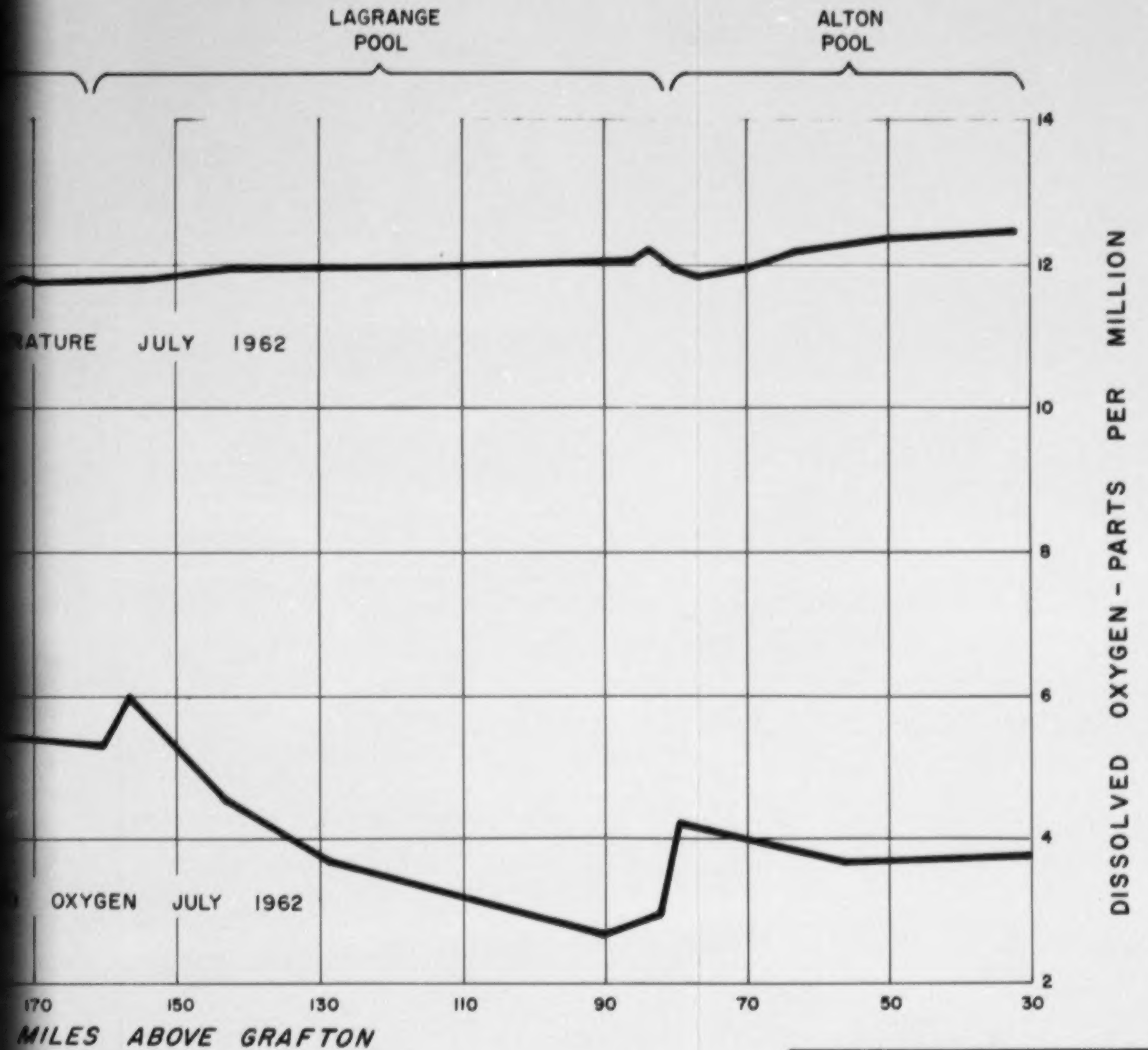
FIGURE 9

R.D.M. 631007


MARSEILLES POOL
STARVED ROCK POOL
PEORIA POOL
TEMPERATURE - FAHRENHEIT
86°
77°
68°
59°
50°
41°
32°
280
270
250
230
210
190
170
150
TEMPERATURE JULY 1962
DISSOLVED OXYGEN JULY 1962
RIVER MILES ABOVE GRAF

A

R.D.M. 631007



B

1

GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

D. O. DETERMINATIONS &
TEMPS. IN THE VICINITY OF
LOCKS ON THE ILLINOIS RIVER

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

FIGURE 8

In light of the fact that better water conditions would thus seem to exist in areas immediately below the locks, insofar as dissolved oxygen is concerned, we would expect fish to gather in these areas with the resulting drawing of fishermen. Unfortunately, this does not seem to be the case on the Illinois River. Studies made of fishing pressure below dams in other states support the fact that fishing is good in tailraces below dams. This is particularly true on some sections of the Mississippi River. Water conditions below locks and dams are of such poor quality on the Illinois that any significant fishing pressure does not occur. Below many dams, detergent foam presents conditions that may discourage wider recreational use. Investigations revealed that although detergent foam was not a problem on the Mississippi River, fishing pressure dropped in those sections that were heavily polluted. Light to moderate pollution did not seem to affect fishing pressure.

Present drinking water standards set by the Public Health Service limit the amount of alkyl benzene sulfonate (ABS or detergent) to 0.5 parts per million. The limits for fish and wildlife are not well enough known so that standards have not been fully described. Existing water quality standards would indicate that 2 to 4 parts per million ABS is harmful to aquatic life and that 5 parts per million is within lethal limits. However, ABS is rarely found at these high concentrations in surface waters. "Soft" detergents, those that can be broken down biologically, are being developed by industry in an effort to replace the persistent or "hard" detergent now so widely used. The impact of detergents upon the

Illinois River fishery and the bottom fauna of the river is unknown. Further investigation is required before an evaluation can be made.

History of the Commercial Fishery

The commercial fishing industry of the Illinois River reached significant proportions as early as 1899. The fishery at that time produced over 70 per cent of all fish taken commercially from the streams of the State, and one-fourth of all fish of the Mississippi Valley.

Historical records picture the Illinois River as being the most important fishing grounds in the State of Illinois. This fact was based upon fishery values covering the late 1890's and early 1900's. The number of men employed in the industry increased by over 40 per cent in 4 years from 1894 to 1897, and the invested capital necessary to cover this growth in the industry increased by over 40 per cent. Due to the enlargement of the industry, the total pounds taken and values increased markedly, particularly in the carp, buffalo, largemouth bass, catfish, black bullheads, crappie, sunfish, yellow perch, and white bass.

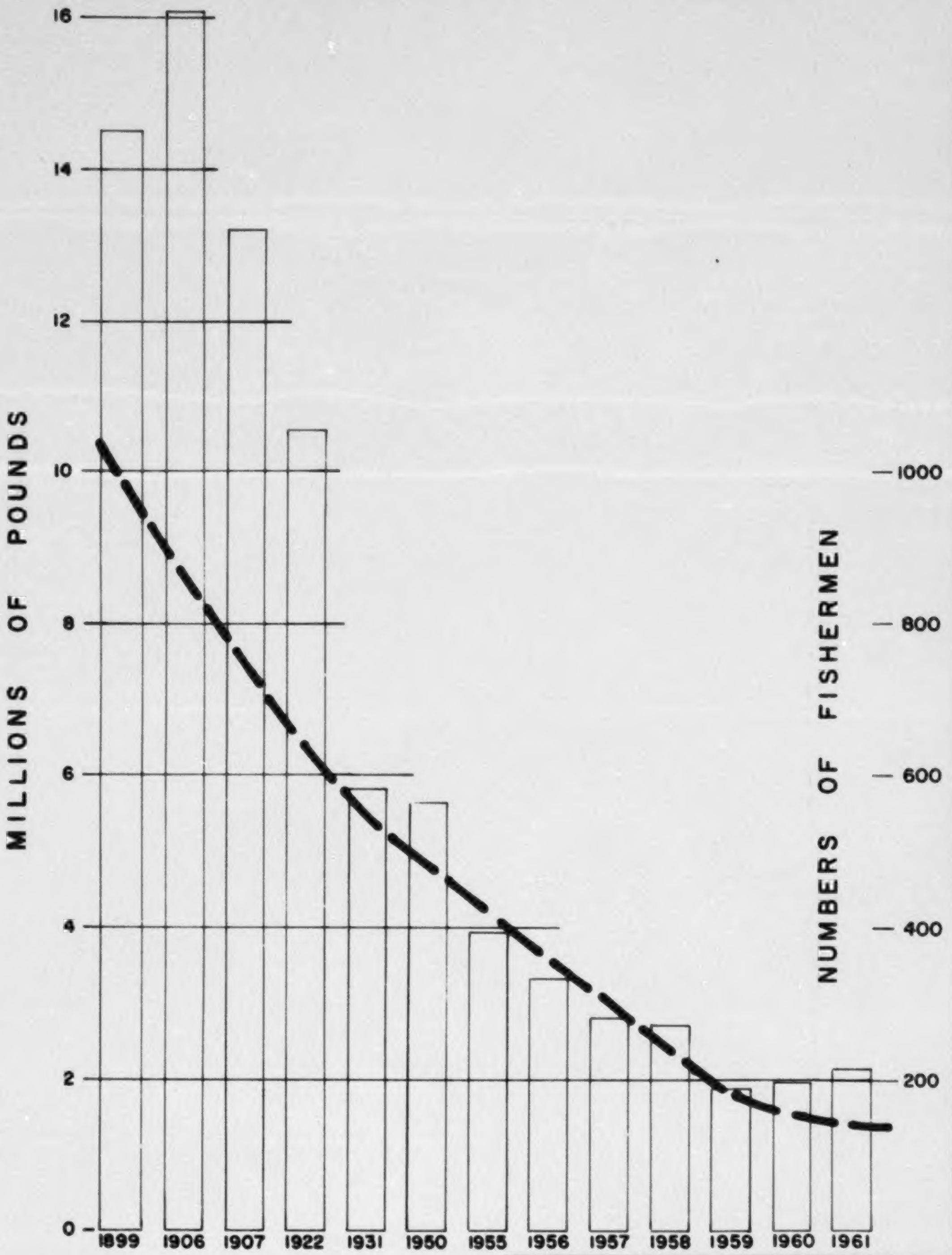
A 1950 report discussed to some extent the drainage and levee districts of the Illinois River and their adverse effects upon flood heights and the one-time great fishery industry of the river (4). The report indicated that the fishing industry of the Illinois River was exceeded in value in the United States by only the Great Lakes and the salmon industry of the Pacific Coast. The report indicated that the decrease in pounds of fish taken from the Illinois, (12 million pounds in 1908 to 4 million pounds in 1915), was due to the flood stages of the river plus the loss of lateral lakes lost through the construction of levees.

Comparisons in total pounds of fish taken commercially from the Illinois River and numbers of fishermen are shown in Figure 9. The chart covers that period of 1899 through 1961. The State of Illinois did not require reports of production from fishermen under its jurisdiction so that data from 1913 to 1925 are not available other than those found by a canvass of the State completed by early investigators.

An added segment of the commercial fishing industry, that of mussel fishing, was at one time an important source of income. The Bureau of Fisheries, after conducting a survey extending from 1907 to 1912, stated that pollution from sewage did not appear to have decreased the quality nor abundance of shells in the last 180 miles of the river. There were one or two exceptions to this. The industry consisted of collection of shells for buttons and for pearls. Prices quoted in 1912 for shells were $12 or $13 per ton. Although the production during recent years has fallen considerably, prices for shells have risen. In a 1956 report a ton of mussels was valued at $30.

According to a commercial fisherman at Beardstown, who still realizes a small income from shell fishing, the industry deteriorated with the development of plastics. He stated that the inability of the plastic product to withstand hot water was the main reason the shell button was still in some demand.

The turtle fishery of the Illinois River annually produces several thousands of pounds. Studies show that from 1956 to 1959 the annual total



GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

COMMERCIAL FISH HARVEST
& NUMBERS OF FISHERMEN
ILLINOIS RIVER 1899-1961

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

R.D.M. 631002

26a

FIGURE 9

taken varied from 2,900 to 8,700 pounds. Value received from these catches varied from $460 to $1,425. Prices per pound fluctuated from 9 to 16 cents in the round. The present wholesale market for dressed turtle is around $.50 per pound.

Deterioration of the Illinois River Commercial Fishing Industry

Commercial fishermen along the Illinois River were contacted in an effort to more fully understand what has occurred in the industry from the commercial fishermen's view. Most commercial fishermen concurred on at least four reasons for the collapse of the industry.

The concensus was that in the upper reaches of the river, that is Ottawa to Peoria, industrial and domestic pollution were the reasons for deterioration of the industry. Although carp, the mainstay of the fishery, is taken in quantity, the quality is such as to make them unmarketable. Quality, in this respect, is related to desirable size. At one time the main markets were in the New York area. However, since large, live carp have dwindled in the catch, this market has been largely lost. Another reason for loss of the New York market, a sociological reason, is that the younger generations of the early immigrants are not following the traditional dietary habits of their forebears -- there is no longer as great a demand for carp.

Many commercial fishermen are leaving the industry for other fields of work primarily because of the scarcity of good quality fish. Fishermen in the lower stretches of the river blame poor fishing upon the heavy siltation of carp spawning grounds, as well as degradation of the habitat and fishing grounds by the heavy flow of barge traffic. In some sections of the river, winter fishing under the ice has been discontinued because of the formation of "gases" that kill the fish trapped in nets.

Many of the commercial fishermen who have fished the Illinois River for most of their lives have left the river fishing grounds to fish private lakes and bays. These men feel that the main fishing and spawning grounds for the fish, carp particularly, were lost with the building of levees with the subsequent drainage of lateral marsh areas. These lateral areas are now leveed and intensively farmed.

In some sections of the river, particularly from Havana downstream, some fishing is done on lateral area bays and lakes. At Beardstown, once the center for the pearl industry, commercial fishing is permitted in the bay on a fee basis. However, the 1961 to 1962 production from the bay did not pay enough to cover the cost of the permit. Good sport fishing exists in the bay for bluegills and crappies. A bait dealer from Beardstown stated that some tension exists between sport and commercial interests over use of sport fishing areas for drag seining and trapping for commercial species.

Present Status of the Illinois River Commercial Fishing Industry

Any significant commercial production above the Starved Rock pool does not exist. Good reproduction of many species, both sport and commercial, takes place here, but survival is extremely poor. Carp, catfish, buffalo, and bullheads are taken in the Starved Rock pool, but the total poundage is only a fraction of that taken in the Peoria, LaGrange, and Alton pools further downstream. Table 4 gives the catch in pounds per pool of all species reported in 1961. These data were supplied by the Illinois State Natural History Survey.

TABLE 4.

COMMERCIAL HARVEST IN POUNDS FROM POOLS
OF THE ILLINOIS RIVER FOR 1961

Species	Above Starved Rock	Starved Rock	Peoria	LaGrange	Alton	Total
Carp	---	500	360,308	320,255	375,541	1,056,604
Buffalo	---	100	352,151	433,178	132,712	918,141
Drum	---	---	1,418	22,889	21,870	46,177
Catfish	---	300	3,661	43,240	39,359	86,560
Bullhead	---	800	19,163	27,106	2,422	49,491
Paddlefish	---	---	---	300	332	632
Suckers	---	---	---	---	50	50
Bowfin	---	---	1,320	3,374	1,895	6,589
Eel	---	---	---	---	24	24
Crappie	---	---	---	21,877	9,024	30,901
White carp	---	---	---	---	2,300	2,300
Gar	---	---	---	---	462	462
TOTALS	---	1,700	738,021	872,219	585,991	2,197,931

Monetary Values of the Commercial Fishing Industry

The dollar return to the commercial fishermen from marketable fish has been decreasing since 1955. The total value of the catch (Table 5) has dropped almost 50 per cent, from about three hundred thousand dollars to slightly over one hundred seventy thousand dollars. Value of gear used also dropped but not in the same ratio as the catch value. Values shown in the table represent fishing efforts only in the navigation pools of the Illinois. Independent or individual commercial interests fish the main river channel but dollar return probably does not amount to significant enough proportions to alter the total picture as shown by the navigation pools.

TABLE 5.

ESTIMATED VALUE OF COMMERCIAL FISHING EQUIPMENT 1/
AND CALCULATED VALUE OF THE CATCH FOR
EACH NAVIGATION POOL. 1955-1961

Year	1955		1957		1959		1961	
Pool	Equipment	Fish	Equipment	Fish	Equipment	Fish	Equipment	Fish
	$	$	$	$	$	$	$	$
Starved Rock	6,230	504	8,950	887	7,300	4,178	6,065	264
Peoria	163,355	96,081	130,499	63,916	126,767	53,270	121,048	50,855
LaGrange	155,985	102,840	198,404	102,668	154,691	68,392	107,582	67,428
Alton	139,556	117,533	118,474	59,528	64,525	53,669	116,055	53,156
TOTALS	465,126	316,958	456,327	226,999	353,283	179,509	350,750	171,703

1/ Equipment includes: Boats, motors, trucks, refrigeration equipment, buildings, and miscellaneous equipment.

The decreased income of the commercial fisherman results from a drop in total pounds of fish taken, not from a decrease in the value per pound on the market. The decrease in pounds taken is a result of the poor quality of the catch plus the loss to the industry of active commercial fishermen. These points have been discussed previously in this report.

Present day fish markets (Figure 10) are modern not only in methods of processing (Figure 11) but also in methods of display and sale (Figure 12).

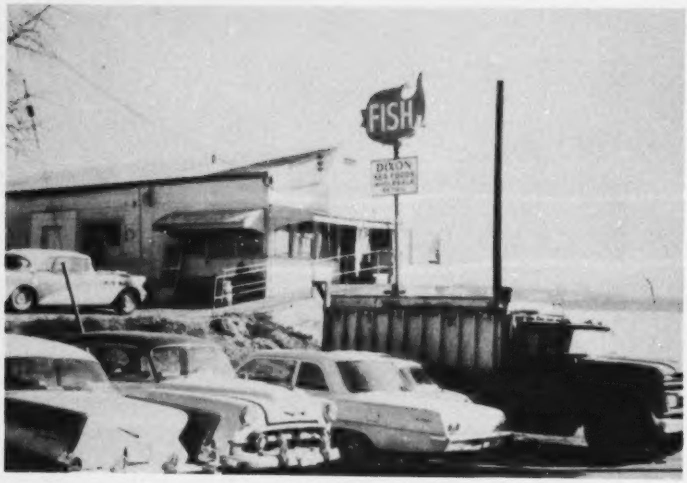


Figure 10. A Present Day Fish Market

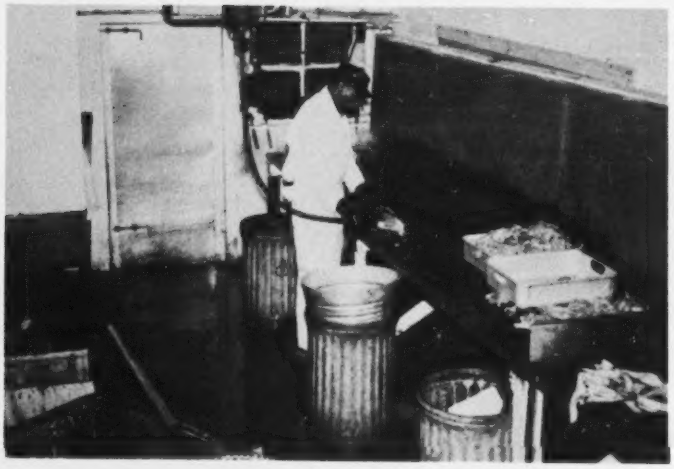


Figure 11. Processing Fish in a Modern Market

The pictured market is at Peoria, Illinois. The owner has been actively engaged in commercial fishing and selling for over 50 years. Figures 13 and 14 show the original market on the banks of the Illinois River about 1903. Figure 15 is an early photo taken in 1905 of the fishermen of the day.

Another reason for the drop in production is the number of individuals engaged in the industry. For example, the number of men employed in commercial fishing in 1899 on the Illinois River totaled approximately 995 full time fishermen. In 1921 this figure had been reduced to 347 full time plus 261 part time fishermen. These part time fishermen were those new to the industry and/or those fishing part time to augment low incomes. Data for 1961 shows a drop in total numbers of commercial fishermen on the Illinois River to 141. This total is made up of 65 full time fishermen plus 76 part time fishermen.

Summary of Present Status

In summary, the present status of the commercial fishing industry on the Illinois River is poor due to at least the following reasons:

(1) Poor quality, or size, of the marketable species, mainly the carp.

(2) The loss of large eastern markets due to the scarcity of large, live carp and loss due to changing of the diet of the siblings of immigrants.

(3) The drainage of bottom lands, once used as spawning areas, for farming.

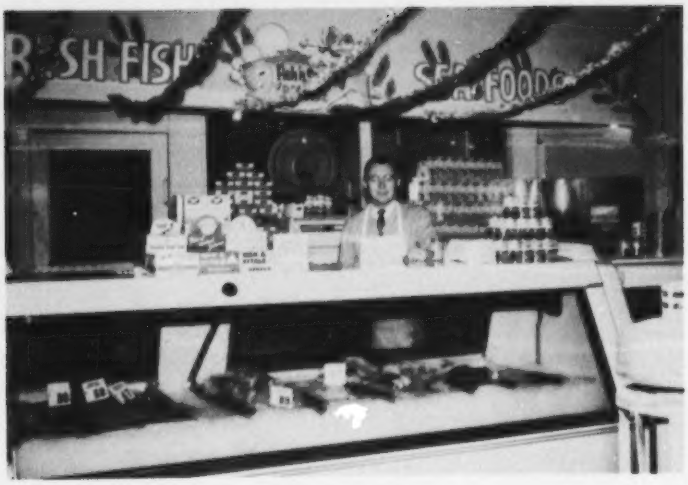

RESH FISH
SEA FOODS

Figure 12. Modern Methods of Display and Sale

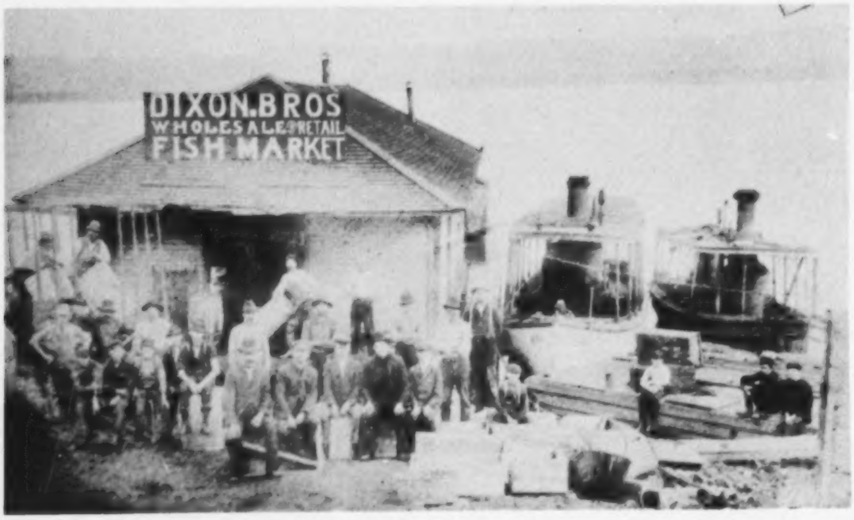

DIXON.BROS
WHOLESALE & RETAIL
FISH MARKET

Figure 13. Original Market at Peoria, Illinois
Photo courtesy Mr. Ross Dixon, Peoria, Illinois

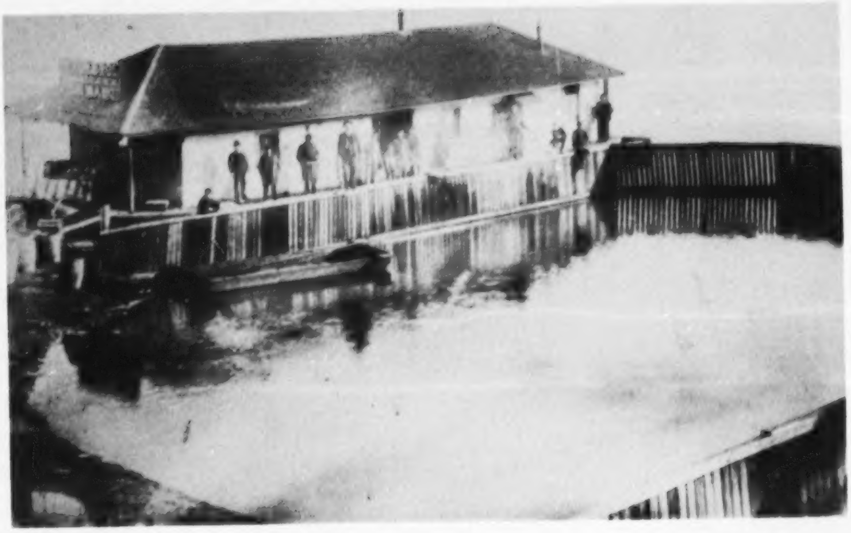


Figure 14. Original Market, Peoria
Photo courtesy Mr. Ross Dixon, Peoria, Illinois

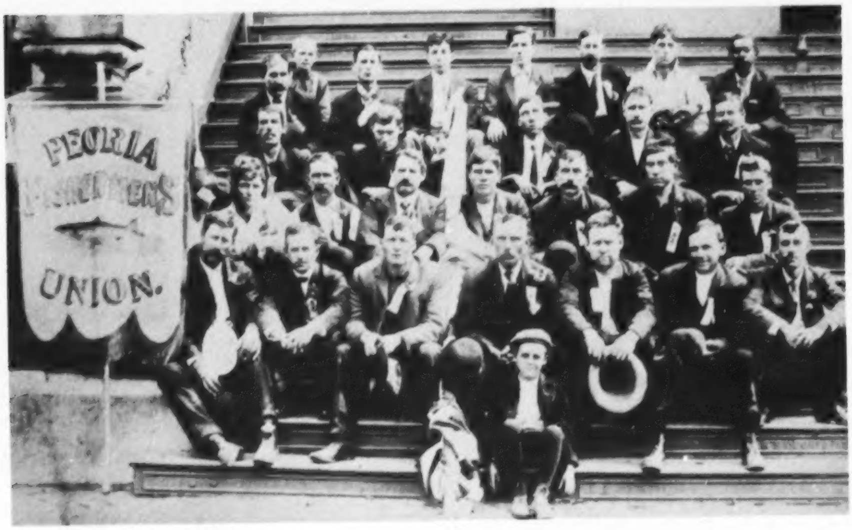


Figure 15. Early Photograph of Fishermen of the Day
Photo courtesy Mr. Ross Dixon, Peoria, Illinois

(4) A slight mud and/or oil taste in fish in some areas (Seasonal occurrence only).

(5) The disappearance of bottom foods, once the mainstay of the diet of carp. This point, although not elaborated on previously, is a result of a degrading of the habitat through pollution.

(6) The loss of available manpower because of economical reasons. Many fishermen feel it does not pay them to fish.

There are, of course, other extenuating circumstances. However, the above causes have been described by the commercial fishermen through personal conversation as well as by personnel of the Illinois State Natural History Survey.

Historical Summary of Biological Aspects of Pollution

Major factors contributing to the pollution of waters of the Illinois River can be traced back in time to at least the year 1885. At that time the population of Chicago, then numbering about 750,000, dumped its untreated sewage directly into the Chicago River. The realization that pollution problems were increasing resulted in efforts that led to the completion of the main channel of the Chicago Ship and Sanitary Canal in 1900. By 1910 the North Shore Channel had been opened, and in 1922 the Calumet-Sag Channel was opened. These structures were to serve as flood water outlets and divert water away from Lake Michigan. They were to receive also the effluent from the North Side Treatment Works.

The downstream movement of silt and pollution almost completely eradicated aquatic plant growth in flood plain lakes in the lower reaches of the river. An abundance of aquatic weeds was present prior to 1894-95. They disappeared shortly thereafter.

Investigations of water quality revealed that between 1913 and 1920, clean water conditions were pushed from about 50 miles above LaSalle to a point 50 miles downstream, an average recession of about 8 miles per year. An important contributing factor to this recession was the increase in wastes emanating from the Chicago stockyards. An increase of 11 per cent in discharged wastes from the stockyards was seen from 1914 to 1920 (7).

Drastic changes in the bottom fauna of the flood plain lakes around Havana, Illinois, were reported in 1915. These changes have been continuing since that time. Studies revealed an increase in sedimentation rates resulting in loss of storage capacity of the lakes as well as a great increase in bottom worms. Pollution by waterfowl was thought to be another contributing pollutional factor in the flood-plain lakes.

A rickets-like infection in carp, noticed first in 1918, followed a depletion of the green, aquatic vegetation in the flood-plain lakes. Siltation was the main factor blamed for the disappearance of vegetation (8).

Investigations revealed that the clean waters around Havana, Illinois, were wiped out by great increases in pollution during 1917 to 1920. The increase of stockyard wastes from Chicago, resulting from the increased output during war years, was thought to be the main cause for the great increase in pollution of the waters of the Illinois during this period.

Intensive farming practices have been censured for the increase in siltation of flood-plain lakes of the Illinois Basin. This increase has been most apparent since 1920 to the present time. Siltation has been termed the direct cause of the deterioration of bottom conditions resulting in great reductions in production of bottom organisms in the lower reaches of the river.

Since 1925 mild improvement has been seen in water quality in the Illinois River above Havana. This improvement is thought to be a result of more effective treatment of wastes from cities bordering the river.

Degraded bottom conditions in Lake Matanzas, a flood-plain lake, resulted in the disappearance of fingernail clams after 1953. The clam is an important item in the diet of waterfowl. Similar conditions have occurred in Lake Chautauqua and Quiver Lake since 1954 (9).

An accidental discharge of anhydrous ammonia from a barge anchored at Creve Couer resulted in the killing of over 5 million fish in 1961. Although spectacular local fish kills may occur from time to time, especially during summer months, the far-reaching and continuously damaging components of water pollution are of more importance to those closely associated with the resources of the Illinois River Basin.

The Identity of Conditions and the Environmental Changes Resulting from Pollution

A suitable fish habitat is one in which suitable numbers of adult fish are produced. Past experience and study have indicated that criteria to ensure favorable environmental conditions to all aquatic life must be set to protect the organisms at all stages in their life cycles. Habitat requirements might generally be classified as: (1) favorable water quality, (2) available spawning areas, (3) available food supplies, and (4) available areas for normal fish movement and use (10).

The development of criteria for water quality is a difficult and complicated problem. It must be kept in mind that various species of fish have different degrees of resistance to adverse conditions. It must be remembered, also, that some species of fish and aquatic organisms may live and reproduce under conditions not favorable to other species.

Water standards for fish and other aquatic organisms are unlike those standards defining water as potable for human use, or industrial use. Water quality criteria, or standards, for aquatic life must be based upon a knowledge of the environmental requirements of the species to be protected. Some fish food organisms have proven to be more resistant than others to organic or toxic materials, or to changes in the stream biota. Past studies reveal that a disappearance of some organisms may often times be of serious consequence, particularly if the organism lost is a key item in the food chain of the higher aquatic animals. This is particularly true of the Illinois River where a lack of available carp food has been listed as one of the causes for the poor quality of the carp.

Past investigations have proven that the surest way to eliminate a species or a group of species is to destroy the habitat or bring about changes in the aquatic environment that make conditions unsuitable for the species (10).

In developing or establishing water quality criteria it must be remembered that survival is not enough and that minimum dissolved oxygen levels, for example, should be suitable for the continuance of life in all stages.

Past studies indicate that the percentage of alkalinity or acidity in the river (pH) was not significantly affected by pollution. The study also revealed that at no point in the upper waterway was the pH lowered into the acid range. Optimum pH ranges are about 5.0 to 9.0. The average pH of the upper Illinois waterway was about 8.5.

Numerous investigators for many years have attempted to formulate a set of standards that could be used as a reference for water quality criteria. Agreement has been surprisingly close in some criteria such as dissolved oxygen. However, other criteria are little closer now than when the overall water quality standards concepts were originated. The classification of streams as to fish fauna, categorizing fish species as to value and use, and minimum and maximum standards are a few of the approaches that have been taken to this quite technical and somewhat elusive subject.

Water quality standards, or criteria, must be set in order to preserve and protect aquatic life and its environment. The criteria, in addition, should assure that growth and reproduction of aquatic plants and animals will continue. Changes in land use, the industrialization of virgin country, and the increase in the multiple uses of water by man have increased the complexity of standards of water quality necessary for fish and wildlife. Even though the use of water by man and the use of water for fish and wildlife cannot be divorced from each other, standards for either can and often do assume positions far apart in the scale of cleanliness and purity. What is considered potable water for man may be toxic to aquatic life and what is acceptable to aquatic life may be far removed from those standards set as acceptable for human consumption. Nevertheless, a set of water quality standards must be formulated that will be acceptable for limited human contact and also be acceptable or desirable for aquatic life.

Aquatic organisms have varying degrees of tolerance to unfavorable conditions in the habitat. It is for this reason that any set of water quality criteria must be broad enough in range to include all those aquatic animals of use or value to man, as well as those aquatic organisms within the life chain of the higher aquatic and terrestrial forms such as fish and wildlife.

Experience has shown that healthy fish populations can exist where conditions are present that are not conducive to maximum growth and activity. The forensic nature of the subject of water quality criteria is more evident when one considers conditions necessary for fish and other aquatic life as well as standards required for the preservation of the habitat. In order to avoid unfavorable conditions for a particular species of plant or animal, all uses of the aquatic habitat by all types of fish and wildlife must be considered. This not only includes the use of water as a medium for movement but the use of water as a medium for food and growth by plants and animals.

Present knowledge of water quality criteria is incomplete or unknown in many respects. The general application of physical and chemical criteria of the suitability of water for aquatic organisms vary to such an extent that tolerances for various aquatic organisms are based chiefly on laboratory investigations under experimental conditions. [1]

Suitable water quality standards for the aquatic organisms of the Illinois River and its tributaries must of necessity be within ranges that are known to be the limits for healthy, well-rounded symbiotic populations. Water use is not a factor. Under consideration only are those conditions necessary for fish and wildlife use. Water use will determine where healthy populations are to be found but it cannot be permitted to prescribe water quality standards where healthy fish populations now exist. It is not within the province of this report to set water quality standards for industrial use or other uses not directly associated with fish and wildlife. It is, however, within the limits of this report to consider other water uses when these uses impinge upon the standards set for fish and wildlife.

All aquatic life requires oxygen. Depending upon their physiological make-up, the minimum amounts of dissolved oxygen necessary to sustain and maintain life will vary for aquatic animals. A search of the literature and past field experiences would indicate that most suitable dissolved oxygen ranges would lie between 2 and 6 parts per million. This would not indicate that aquatic life would perish below or above this range. It only describes an area that would be suitable for a general aquatic community. It is suggested that for the Illinois River, dissolved oxygen ranges lie between 2 and 6 parts per million, with 2 parts per million being the minimum acceptable quantity. The determination of the quantity of dissolved oxygen from a so-called "grab" sample would, of course, vary from hour to hour or from day to day. However, a quantity of dissolved oxygen below 2 parts per million could prove detrimental to many kinds of aquatic life if such a minimum quantity persisted over a 24-hour period.

---

[1] The Physiology of Fishes, Vol. II, Behavior, pp. 403-430

The hydrogen ion concentration, or pH, of the aquatic environment will also vary, but fatal concentrations of pH are unusual except for periods of unusual polluted conditions. Most aquatic life can be maintained indefinitely within a pH range of 5.0 to 9.0.

The temperature requirements for aquatic life fluctuate with individual genetic requirements. The temperature range of from 39 degrees Fahrenheit to 90 degrees Fahrenheit is suggested for acceptable temperature variances in the Illinois River. Wide seasonal variances occur; for this reason any acceptable temperature range must, of necessity, be quite broad.

Water quality criteria other than the most basic factors of dissolved oxygen, pH, and temperature are so variable that no attempt will be made to indicate their standards. Criteria such as turbidity, phosphates, chlorides, nitrates, and others enter the total make-up of the aquatic environment. Their individual needs, amounts, and effects are so variable however, that they will not be considered in this report. It is suggested that investigations be made in this later category so that future criteria can be described for the Illinois River and its tributaries.

A study of turbidity and sedimentation at Lake Chautauqua revealed that turbid conditions during summer months were caused by fish activity. Carp, in particular, when rooting up bottom muds for food increased turbidity measurably. Lack of oxygen during parts of the summer resulted in a localized fish kill from asphyxiation. The study also indicated that fluctuating water levels at Lake Chautauqua, caused by river stages, were instrumental in preventing an over-populated condition in the lake (11).

The fluctuating water levels were also responsible for adverse effects upon aquatic vegetation. Aquatic plant life, which is termed the chief basic source of organic food of animal life in natural waters, can be completely eradicated by silt. Submerged aquatic weeds in many lateral water areas adjacent to the Illinois River have been eradicated because of siltation. Lake Chautauqua and Anderson Lake have limited areas of beds of sago pondweed (*Potamogeton pectinatus*). This aquatic, however, is classified as a normal member of the silted community. Submerged aquatic plants are not only basic to food production but provide areas in which smaller fish may hide, rest, and develop.

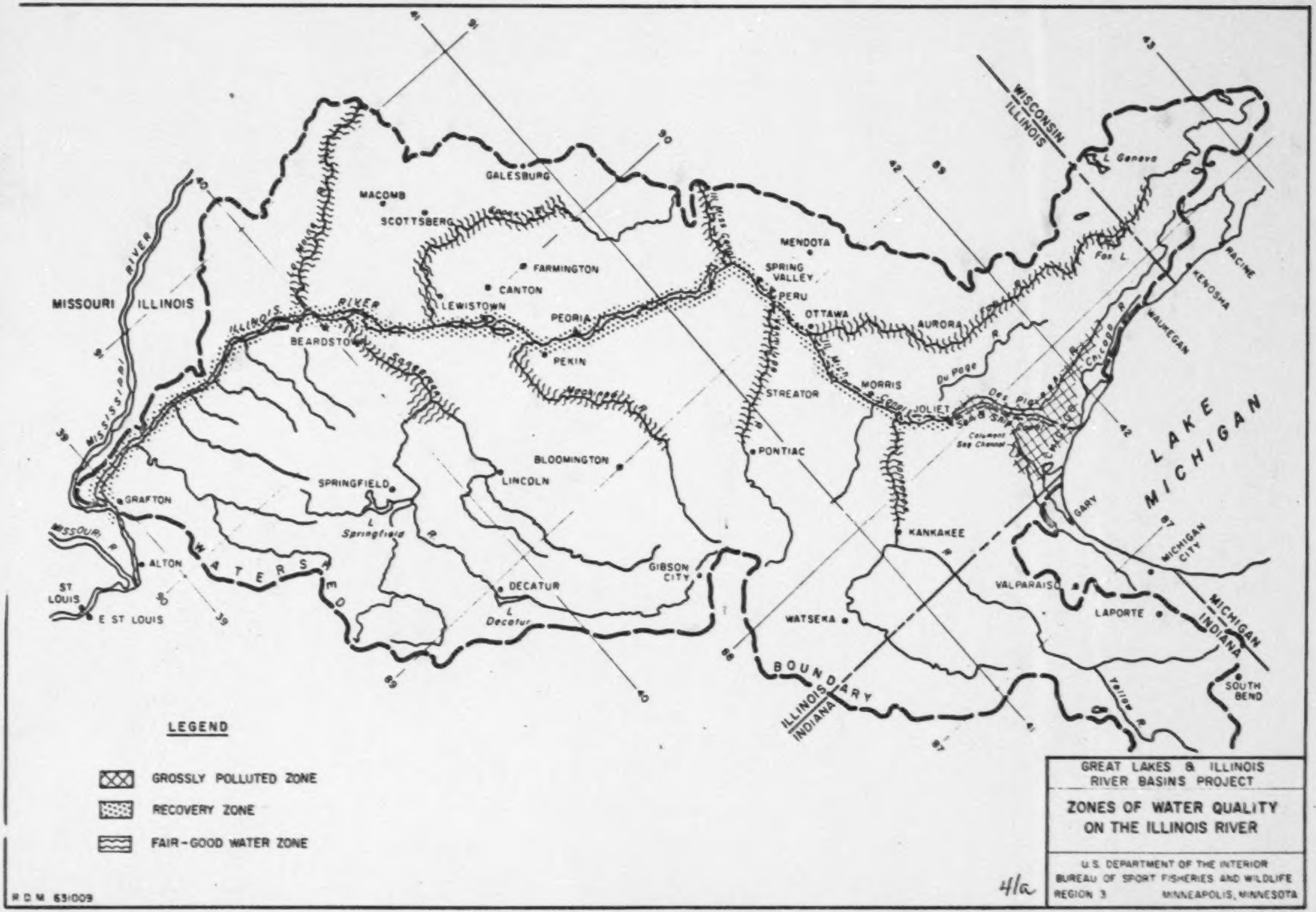
Generally speaking the chemistry of the water in the Illinois River from the junction of the Des Plaines and Kankakee downstream is within limits considered safe for fish life. Biologically, however, conditions do not meet standards for healthy maintenance of aquatic life. Algae is an important element in the aquatic habitat in the production of oxygen and as a source of food. Abundant growths of algae were not found above Starved Rock pool. Downstream from Starved Rock pool algae growths were heavy, particularly in Peoria pool. According to data from past investigations, the Illinois River is biologically degraded from the inlet structure at Wilmette, Chicago Harbor, and Calumet Harbor, downstream to Peoria Lake.

Figure 16 shows the zones of water quality of the Illinois River basin. Recovery is continuous from below Pekin to Grafton except for local areas near towns bordering the river.

Industrial pollution in the upper reaches of the Illinois River and siltation and sedimentation in the lower stretches are factors claimed to be the reasons for poor quality in commercial fish, particularly the carp. Although few cases exist in which bad taste has been imported to fish of the Illinois River, many cases do exist of a "hospital" taste occurring in fish taken near the mouth of the river and down the Mississippi to below St. Louis.

Seasonal occurrences of an oil taste in carp taken in winter netting are known. However, this does not appear to be a serious problem at present in the Illinois River.

Studies on flood-plain lakes of the Illinois River near Havana, Illinois, revealed that siltation and other forms of pollution had brought about extreme changes in the bottom fauna of the lakes investigated (9). The


MISSOURI
ILLINOIS
WISCONSIN
ILLINOIS
ILLINOIS
INDIANA
MICHIGAN
INDIANA
LAKE MICHIGAN
MISSISSIPPI RIVER
MISSOURI R.
ILLINOIS RIVER
WATERSHED BOUNDARY
GALESBURG
MACOMB
SCOTTSBERG
FARMINGTON
CANTON
LEWISTOWN
PEORIA
PEKIN
BEARDSTOWN
MENDOTA
SPRING VALLEY
PERU
OTTAWA
AURORA
MORRIS
JOLIET
STREATOR
PONTIAC
BLOOMINGTON
LINCOLN
SPRINGFIELD
L Springfield
DECATUR
L Decatur
GIBSON CITY
WATSEKA
KANKAKEE
GRAFTON
ALTON
ST LOUIS
E ST LOUIS
L Geneva
Fox L.
Fox R.
Du Page R.
Des Plaines R.
Chicago R.
Calumet Sag Channel
Sag Ship Canal
Ill. Mich. Canal
Ill. Miss. Canal
Sangamon R.
Mackinaw R.
Vermilion R.
Kankakee R.
Spoon R.
La Moine R.
Yellow R.
CHICAGO
GARY
MICHIGAN CITY
VALPARAISO
LAPORTE
SOUTH BEND
WAUKEGAN
KENOSHA
RACINE
43
42
39
40
41
87
88
89
90
91
LEGEND
GROSSLY POLLUTED ZONE
RECOVERY ZONE
FAIR-GOOD WATER ZONE
R.D.M. 631009

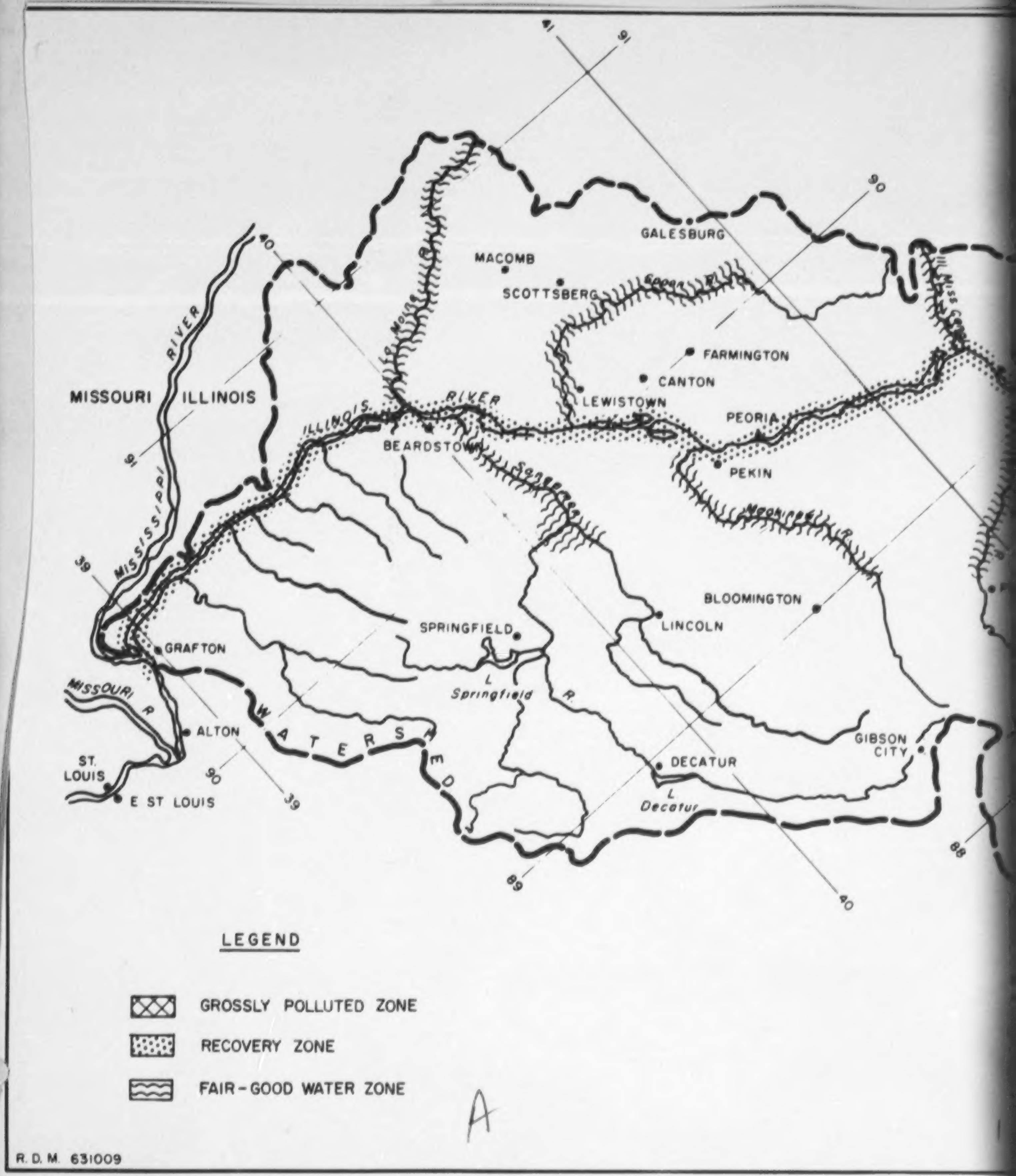
GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

ZONES OF WATER QUALITY
ON THE ILLINOIS RIVER

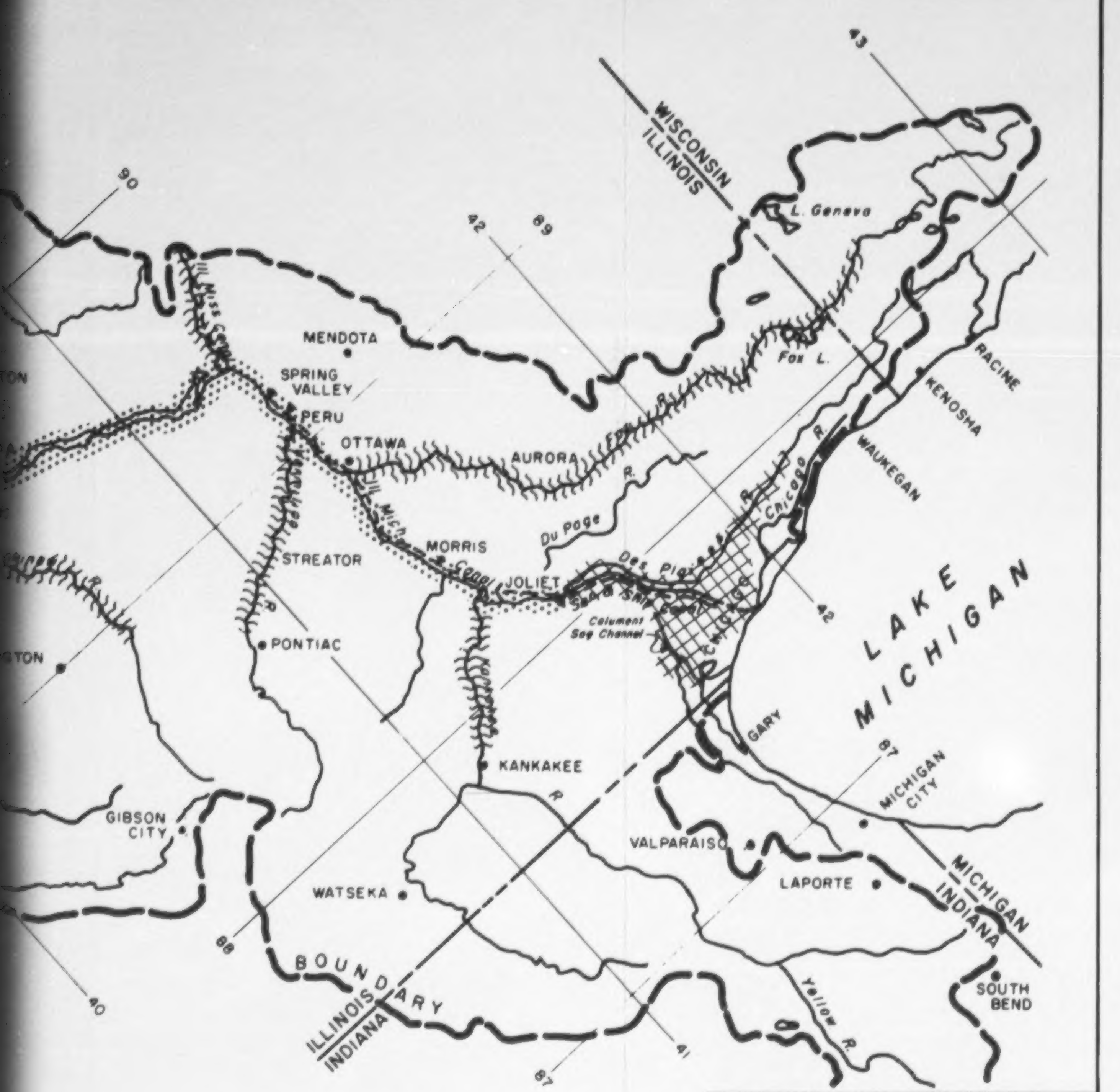
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

4/a

FIGURE 16


MISSOURI
ILLINOIS
MISSISSIPPI RIVER
MISSOURI R
ILLINOIS RIVER
WATERSHED
GALESBURG
MACOMB
SCOTTSBERG
Spoon R.
FARMINGTON
CANTON
LEWISTOWN
PEORIA
PEKIN
BEARDSTOWN
La Moine R
Sangamon
Mackinaw R
BLOOMINGTON
LINCOLN
SPRINGFIELD
L Springfield
R.
GRAFTON
ALTON
ST. LOUIS
E ST LOUIS
DECATUR
L Decatur
GIBSON CITY
Ill Miss Canal
41
91
90
40
39
89
88
LEGEND
▨ GROSSLY POLLUTED ZONE
▒ RECOVERY ZONE
≋ FAIR-GOOD WATER ZONE
R. D. M. 631009

A


WISCONSIN
ILLINOIS
43
90
42
89
L. Geneva
Fox L.
RACINE
KENOSHA
WAUKEGAN
MENDOTA
SPRING VALLEY
PERU
OTTAWA
AURORA
Fox R.
Du Page R.
Des Plaines R.
Chicago R.
Ill. Miss. Canal
Ill. Mich. Canal
Vermilion R.
MORRIS
STREATOR
JOLIET
Sanitary Ship Canal
Calument Sag Channel
CHICAGO
42
LAKE MICHIGAN
PONTIAC
Kankakee R.
KANKAKEE
GARY
87
MICHIGAN CITY
VALPARAISO
LAPORTE
MICHIGAN
INDIANA
SOUTH BEND
GIBSON CITY
WATSEKA
88
40
BOUNDARY
ILLINOIS
INDIANA
Yellow R.
41
87

GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

ZONES OF WATER QUALITY
ON THE ILLINOIS RIVER

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

1

B

FIGURE 16

amount of siltation entering the lakes through flooding of the Illinois River has drastically reduced the storage capacities. Lack of preferred bottom foods has been blamed for the poor growth of some game species in one of the lakes. Particularly involved are the gill-breathing, bottom-dwelling insects such as stoneflys, caddis flies, and mayflies. These insects are valuable not only in the immature stages but also as adult flyers as food for fish.

Data from past studies indicate that at Lake Chautauqua the fishing success for largemouth bass and yellow perch has declined since 1943. Few fish were taken in nets and seines and the scarcity of the two species was laid to the adverse effects on the environment by sedimentation and turbidity. However, other species have benefitted, and the lake produces good catches of crappies, drum, bluegills, and yellow bass.

The possible adverse effects of detergents upon bottom-living organisms is not fully understood, but the possibility exists of adverse effects upon the molluscan population (Figures 17 and 18).

Many of the flood-plain lakes adjacent to the Illinois River are quite shallow due to heavy sedimentation by silt from flooding of the Illinois River and are overfertilized from the effects of domestic sewage and runoff from surrounding farmlands. The bottom muds are exceptionally rich in phosphates, nitrates, and potassium. The abundance of nutrients in the waters of the flood-plain lakes accounts, in part, for extreme turbidities in the lakes during the summer months. Although much of the sediment and turbidity arises from surrounding farmland drainage, high concentrations

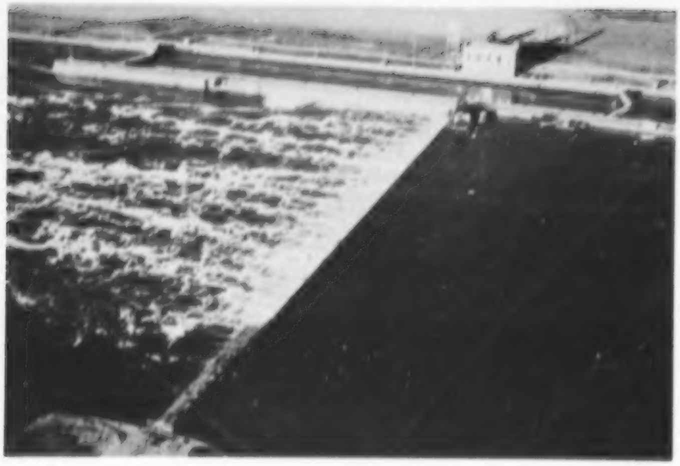


Figure 17. Detergent Foam at the LaGrange Dam

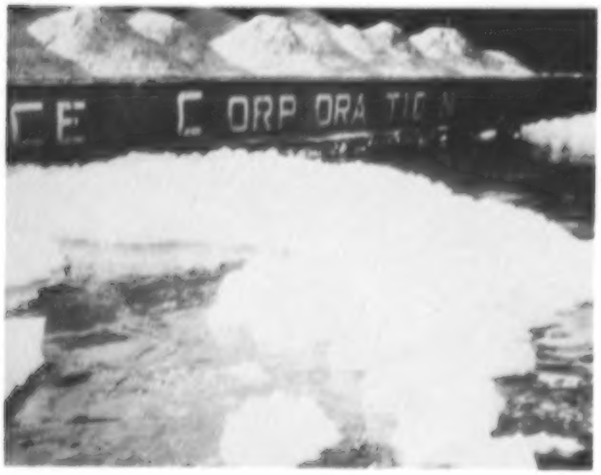

CE CORPORATION

Figure 18. Detergent Foam at the Lockport Lock

of nitrogen and phosphates have been attributed to organic wastes from waterfowl (9). The high nutrient content of the water results in high phytoplankton production which adds to the turbidity of the water. Excessive phytoplankton growths in the shallow, rich lakes have, at different periods, caused an "oxygen pulse" in which high concentrations of oxygen during daylight hours are followed by extremely low oxygen concentrations at darkness. A study at Lake Chautauqua revealed that in July 1953 abnormal fish activity was related to reduced oxygen concentrations in the water.

Although high concentrations of nutrients indirectly add to turbidities, they also result in high production of aquatic animals.

The heavy siltation of flood-plain lakes coupled with the leveeing, draining, and subsequent farming of former marsh areas has drastically reduced the potential of the commercial fishing industry.

Flood-plain lakes such as Senachwine, Henry, Sawmill, Douglas, and Quiver have an average depth of from 1 to 3 feet. The bottom makeup is silt and ooze that does not support rooted aquatic vegetation. Past investigations of bottom organisms revealed that sludgeworms and bloodworms were the only organisms present. Bottom conditions at Muscooten Bay, near Beardstown, were much improved, yielding organisms usually associated with better water quality conditions.

From a study of the bottom-land lakes adjacent to the Illinois River, it was apparent that the availability of public fishing waters has not increased with the increase in population and resultant increase in fishing interest. Many areas once preferred for sport fishing have been lost through the effects of pollution.

A study of the malformation of carp of the Illinois revealed that the appearance of the malformed carp coincided with the depletion of the green aquatic vegetation. The malformation, resembling rickets infection in man, was observed almost wholly in carp. The depletion of the aquatic vegetation plus an increased sewage load in the river took place during the years 1916 to 1918. The malformed carp appeared the following year (8).

The rickets-like conditions which affect the bones of the skull also retard growth of the fish. The disease had reached such proportions in the river from Peoria downstream to Pekin that it was felt it resulted in a general decrease in the yield running into millions of pounds per year. However, aside from the reduction in quality of the carp, the flesh was not impaired and was still usable as food.

Fish Management Efforts on the Illinois River

The main fish management efforts by the Illinois Conservation Department on the Illinois River consist of providing facilities for the fishing public, and cooperating closely with the Sanitary Water Board and the Metropolitan Sanitary District of greater Chicago to improve water quality of the river.

Present Management Efforts

Many launching ramps, parking, and dock areas have been constructed from Morris, on the upper Illinois, to Grafton at the lower end of the river.

Cooperation with local communities has helped provide many additional needed facilities.

Fishermen and hunter access areas such as Stump Lake, the Glades, and Godar-Diamond Island are managed by the State through a management agreement with the U.S. Army Corps of Engineers and the Bureau of Sport Fisheries and Wildlife. The lands are owned by the Corps and the facilities are built by the State. Facilities to be found at some of these areas include concessions, boat liveries, boat docks for private boats, picnic tables, and toilets. Construction of the facilities is financed through Federal Aid funds.

Restocking the river with game fish species is not practical. Adequate environments already exist and reproduction is good in many sections. However, water quality limits the production of the more preferred game species such as the walleye and the smallmouth bass. Since the environment for these preferred species already exists, the major problem is one of water quality (12). Habitat improvement through natural purification of the river and artificial habitat improvement by man would follow the improvement in water quality of the Illinois River.

Management of the main channel of the Illinois River is difficult except on small, local areas. Factors such as fluctuating water levels, floods, and industrial and domestic pollution make river-length management plans impractical. Barge traffic on the river approximates the effects of floodflows in that the bottom living organisms are destroyed through the element of a continuously shifting environment.

Past experience indicates that the application of fish management principles depends upon several factors; man is probably one of the most important. The control of the environment plus factors limiting the size and species of fish populations are among other techniques of management. Improvement of some sections of the Illinois River, particularly near centers of high populations, would soon result in utilization of these improved areas.

A study of the presence or absence of largemouth bass and crappies in several reaches of the river indicates that sport fishing could be improved if brush shelters for fish could be provided. The study also indicated that Peoria Lake, in particular, was in need of such habitat improvement (12). This area is one of high population density and State fish management officials feel that improvements made in the fishery of the river at this point would soon be utilized by local sportsmen.

Past Management Efforts

The improvement of conditions for sport fishes in the lateral lakes of the river has been attempted through a program of rough fish removal. The results of this program indicated that the environment was not improved by removing carp and other non-game species. Turbidity of the lakes studies did not lessen, nor did conditions improve sufficiently to encourage the growth of aquatic weeds. Any removal of noxious fish species would be short lived, since high water stages of the river would flood the lateral lakes and restock them with unwanted species of fish.

Lateral water areas would be improved for both sport and commercial species if losses of water depth through sedimentation could be decreased or if water depth could be increased. Several methods for improving water quality of the Illinois Waterway have been proposed by the Public Health Service in their Interim Report. Any method used shall be costly and will not be a simple solution to the pollution problem now existing in the waterway.

A survey report for flood control and allied water uses of the Illinois River and its tributaries indicated that a further expansion of State and Federally controlled lands was necessary to accommodate the increasing recreational uses of the basin area. The survey also indicated that continuing conditions that tend to reduce the recreational opportunities, (which were already limited) should be prevented, if possible.

Future Management Possibilities

A report of potential conservation areas of the Illinois River from Hennepin to Grafton, indicated that the people of the state would benefit financially if selected drainage and levee districts were converted into conservation pools for hunting and fishing grounds. The report pointed to the fact that although these monetary benefits were of an intangible nature, potential conservation values were of an equally intangible quality (4).

Pollution of the Illinois River is a problem requiring continuing control. The industrial and domestic pollution of the upper Illinois and the siltation problems of the lower Illinois are the responsibilities of all people benefitting from any improvement of water quality.

An improvement in water quality has been seen with the advent of modern sewage disposal plants. Siltation from modern farming practices still presents sedimentation problems of the lateral lakes of the lower Illinois River. An investigation of siltation and sedimentation ratios determined that on selected areas improved conservation practices would greatly reduce soil losses from cultivated fields.

Flood-plain lakes are, geologically, a very short-lived structure. However, changes in land use can and have greatly speeded destruction of these lakes. Lake Chautauqua, during the period October 1926--July 1950, suffered a capacity loss of 0.77%/year, a total of 18.3% of the original capacity. Other lakes, with more direct connection to runoff, have had capacity losses to 3%. Proper conservation measures can reduce sedimentation by 75%.

Forecasts of human population indicate that the purchase of additional access areas will be necessary, particularly in those areas adjacent to the flood-plain lakes. Purchase of flood-plain land will also be necessary if areas for fish spawning are to be provided.

Continued construction and placement of shelters for fish are necessary in order to improve environmental conditions. Larger fish frequent the perimeters of such devices in search of food. Therefore, the shelters also provide sites for fishing.

Potentials of the Commercial and Sport Fisheries

The Illinois River Basin is a source of recreation to approximately 9 million people, most of whom live in the greater Chicago metropolitan area.

Population forecasts predict a total population of over 18 million for this same area in fifty years.

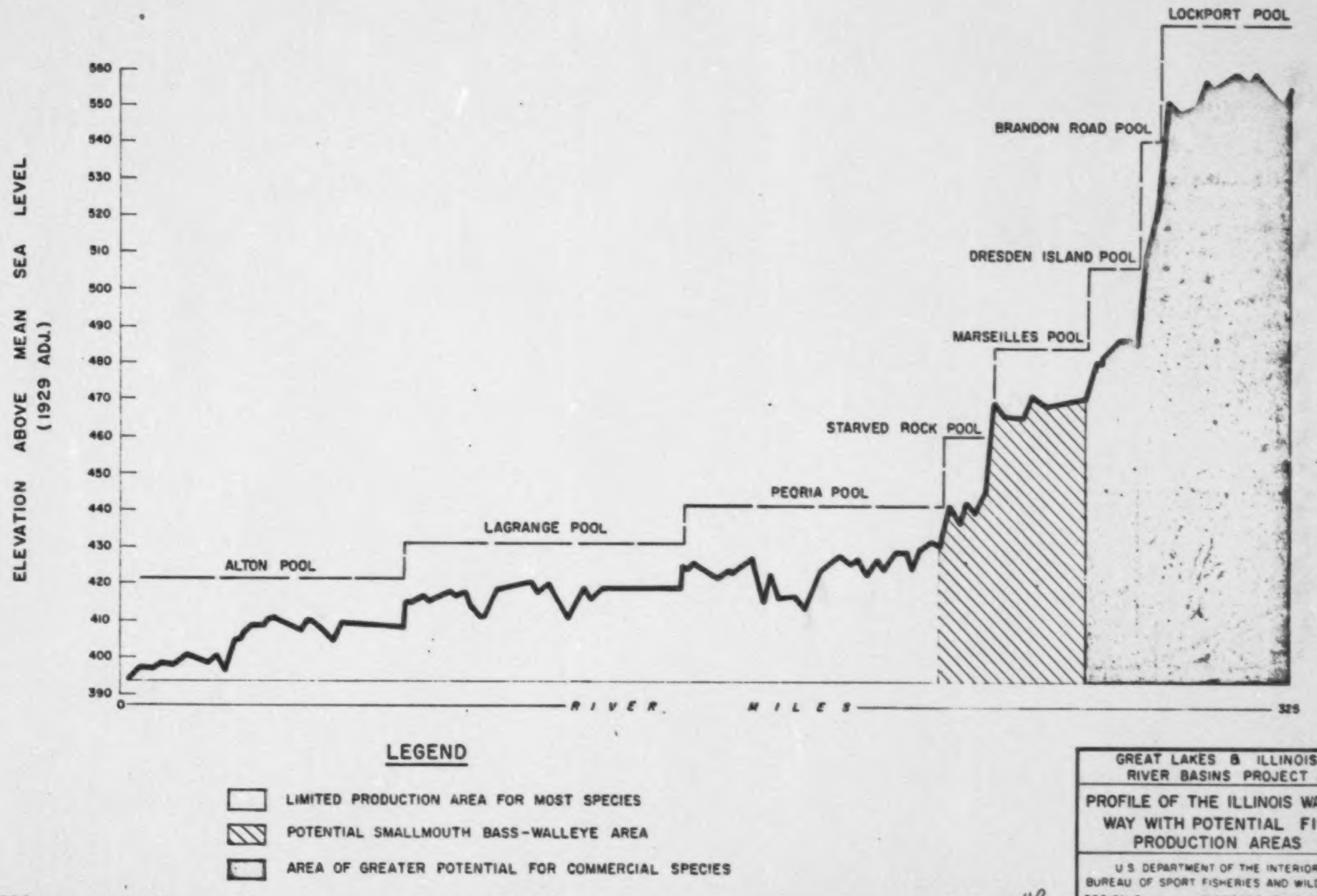
Since the potential number of fishermen will increase with the increase in population, a forecast of the potential fishery of the basin is necessary for providing future fishing opportunities. The forecast of potential fishermen is discussed in this report under the extent of present and future use.

The potentials of the Illinois River Basin fishery include several points for consideration from the biological and physical viewpoints. The biological points to consider are all based upon the condition of the water quality. These points are:

(1) Under better water quality conditions, the upper portions of the river would be suitable for populations of smallmouth bass and walleyes. The area considered here is the Marseilles Pool-Starved Rock-Morris area. The habitat for these species exists here, although it is in a degraded condition at present. However, under better water quality conditions the habitat could be developed for production. Figure 19 shows the areas of potential fish producing areas.

(2) Populations of crappies would increase in the Marseilles Pool-Starved Rock-Morris area, as would the bluegills. Rock bass production could also develop under better water quality conditions.

(3) Better water quality would improve the quality of the commercial species such as the drum, carp, channel catfish and buffalo in



GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

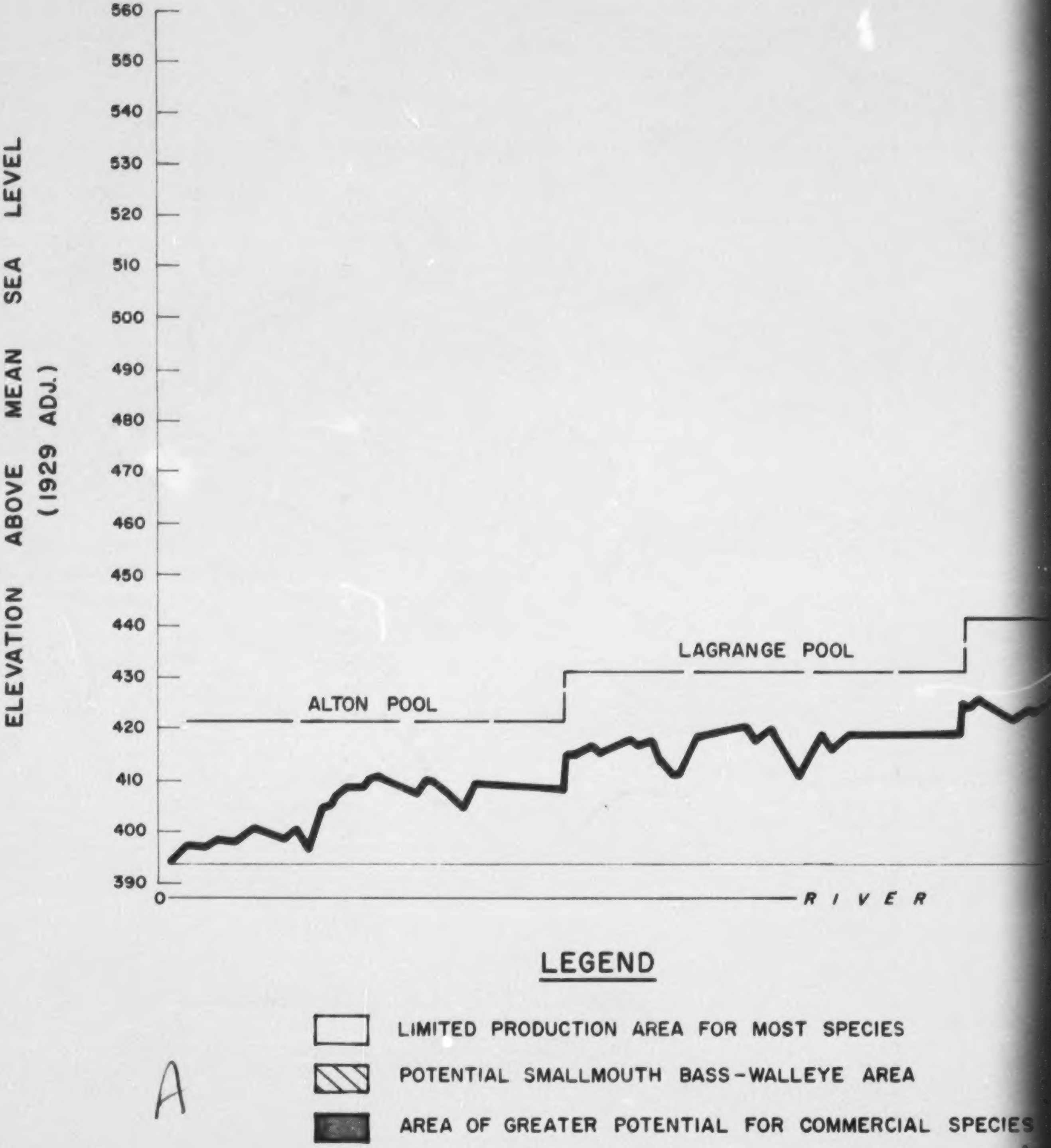
PROFILE OF THE ILLINOIS WATERWAY WITH POTENTIAL FISH PRODUCTION AREAS

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

R.D.M. 631010

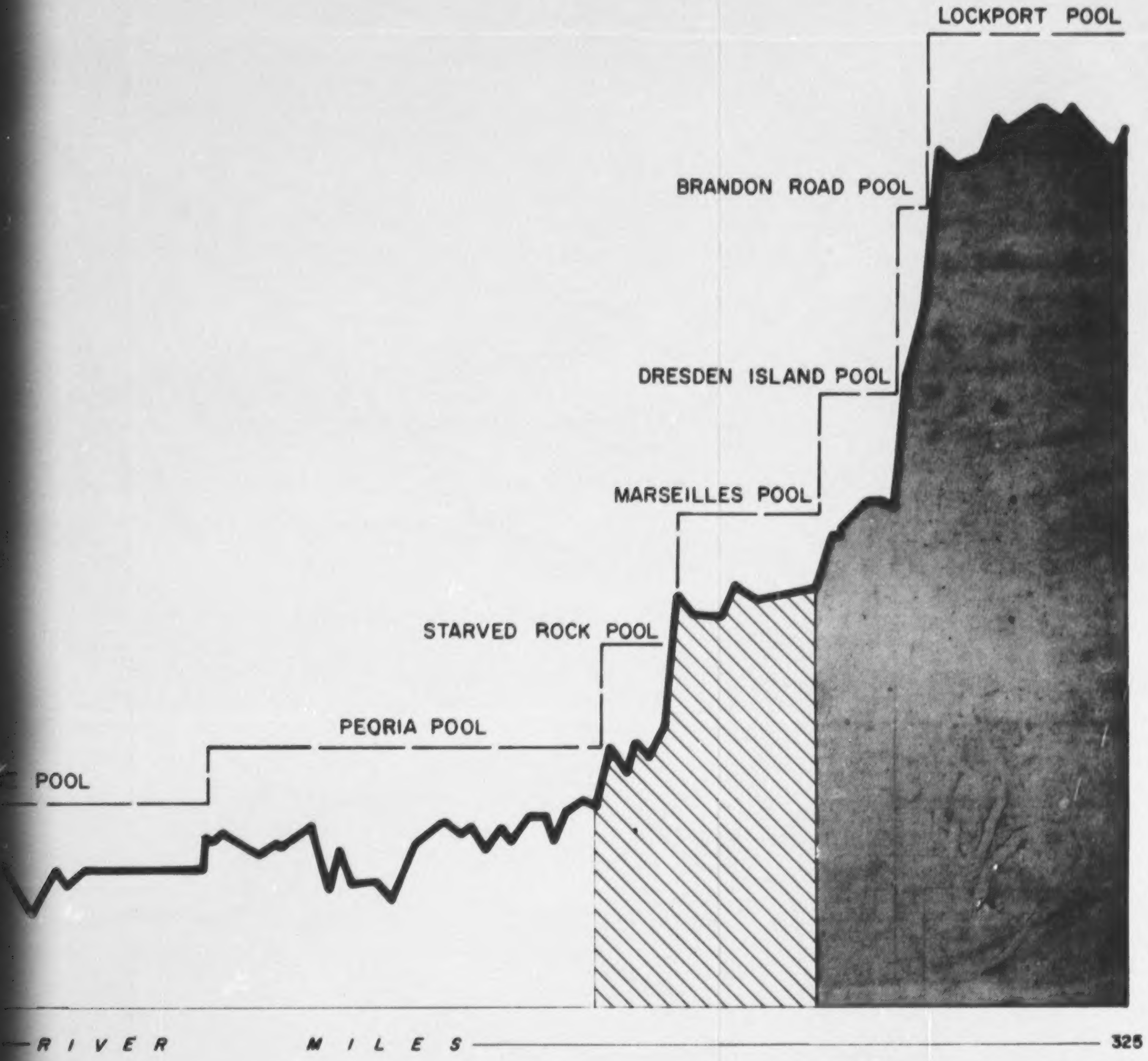
49a

FIGURE 19


ELEVATION ABOVE MEAN SEA LEVEL
(1929 ADJ.)
560
550
540
530
520
510
500
490
480
470
460
450
440
430
420
410
400
390
0
ALTON POOL
LAGRANGE POOL
R I V E R
LEGEND
☐ LIMITED PRODUCTION AREA FOR MOST SPECIES
▧ POTENTIAL SMALLMOUTH BASS-WALLEYE AREA
■ AREA OF GREATER POTENTIAL FOR COMMERCIAL SPECIES

A

R. D. M. 631010



ST SPECIES

LLEYE AREA

COMMERCIAL SPECIES

B

GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

PROFILE OF THE ILLINOIS WATERWAY WITH POTENTIAL FISH PRODUCTION AREAS

U S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

FIGURE 19

the Starved Rock and Marseilles pool.

(4) Present stocks of goldfish, a rough, non-commercial species, would dwindle under pressure from the more desirable game species such as the walleye and the channel catfish.

(5) Below the Starved Rock pool, better water quality would improve the stocks of commercial species, thereby directly improving the declining commercial fishing industry.

(6) More rigid control of barge traffic on the river in relation to oil wastes would aid in the improvement of the habitat for fish and wildlife. Many reports from commercial fishermen would seem to indicate that barges, from time to time, have flushed out their cargo tanks, causing heavy deposits of oil waste to be formed on shoreline areas. In some instances, fishing devices set in the river have had to be removed due to heavy oil coatings.

(7) The tremendous sport fishing resource is not being exploited to its fullest potential. Education of the fishing public in methods of fishing and baits to use in selected river areas would increase theutilization of the resources.

(8) A survey conducted to investigate potential conservation areas along the Illinois River reported that the river bottom areas now being farmed might ideally be suited to conservation areas should they be returned to their natural state. Listed were several drainage or levee districts encompassing over 50,000 acres that offered great potential as conservation areas. The survey further discussed possible economic hardships to farmers,

and farming activities, should these bottom-land areas be reverted to lake and marsh conditions. However, fishermen-day use of the conservation area would more than offset the economic loss of farming activities.

WILDLIFE

This survey of wildlife resources has been restricted, with minor exceptions, to the main stem of the Illinois River and the adjacent wetlands. Very little data has been presented concerning the tributary streams and portions of the basin outside the boundaries of the State of Illinois.

Historical Background

Probably no area of this nation had the wildlife resources that the Illinois Basin possessed and yet so completely lost. Archaeologists tell us that no part of North America has evidence of heavier Indian population nor longer Indian occupancy than the Illinois River drainage. To this fertile valley the Indians gave the name "Sangamo" or "The Country where there is plenty to eat." (13)

The white man also found the Illinois Valley to be a great storehouse of food. The rich soils produced well; the river teemed with fish; the forests were well stocked with deer, turkey, partridge and squirrels; the upland prairies had vast flocks of prairie chickens; but most spectacular of all were the countless thousands of waterfowl which lingered to rest and feed during their spring and fall migrations. "For many years, during this early period of development of Illinois, wildfowl were so plentiful that they were often a nuisance to settlers." (13)

The flood-plain lakes which dotted the Illinois along much of its course gained wide acclaim as a waterfowl hunter's paradise. It was not uncommon for a shooter to bag over 100 ducks per day during the spring. Among the many problems faced by these early hunters were carrying enough shells to the marsh in the morning and hauling the weight of the bag to town in the evening. The market hunter with his overcharged big-bore gun had no problem making a good living with big ducks selling for 15¢ each and small ducks at 10¢ (14).

Although duck baiting was common practice over much of the country during these years, it was not deemed necessary along the Illinois because of the abundance of natural foods. It was not until 1900 that this practice began in the Sangamon bottoms. At this time the Chicago Ship and Sanitary Canal opened and with it water diversion from Lake Michigan, which raised water levels and rapidly extended the zone of heavy pollution. These two factors caused a drastic reduction in the more important duck food plants (15). Baiting in Illinois reached its height not in the marshlands but on the surrounding upland fields. These dry-land clubs consisted of a small pond (the water was usually pumped from a well), a pen of live decoys, and the site liberally baited with corn. In 1928 over 7,000 bushels of corn were used as bait on one 20-acre tract. One dry-land club killed 4,000 ducks on 40 acres during the season (16). One observer reported counting 250 field pens during an aerial survey over uplands of Mason County (15), and the Park Hotel at Beardstown boasted a cooler capable of holding 5,000 ducks and turning many hunters away because the cooler was full. Fortunately, Federal regulation in 1935 put a stop to the practice of baiting.

This was also the drainage era. During the early 1900's almost 175,000 acres of prime wetland habitat were diked off, ditched, and drained (4).

Aldo Leopold in his "Report on a Game Survey of Illinois" (1929) called the area "one of the most highly artificialized agricultural landscapes of North America." Of even more importance, he further stated, "the undrained remnants of the larger river bottoms are now the most valuable larger blocks of waterfowl land in America."

In 1886 a group of businessmen from Peoria formed the first hunting club and named it "Duck Island Preserve." Today less than 20 per cent of the available waterfowl habitat is open to the free-lance hunter. Almost all good areas are controlled by more than 300 private and commercial clubs. A private duck club bears the same resemblance to a commercial club that a country club does to a night club. However, lest the reader get the wrong impression, many of these private clubs practice excellent game management and maintain large refuges.

Since the Illinois River drains one of the most fertile areas of the continent and forms the navigational link between the Mississippi and the Great Lakes, it was only natural that the advances of both agricultural and industrial development should have been greatly accelerated and intensified in this area. Here lived John Deere and Cyrus McCormick, the great agricultural inventors. Here also lived Fred Kimble, the inventor of the choke-bore shotgun. Two agricultural advances were of particular significance to the wildlife populations. First, the tractor, unlike "old dobbin," could plow the steeper grades. Second, the introduction of the soybean in the 30's and its widespread use in Illinois eliminated much of the grassland farming. Both of these factors greatly increased erosion and contributed to the rapid siltation of the river and flood-plain lakes.

More recently the development of large suburban areas and accelerated highway construction have added huge quantities of silt to the waters. There is little doubt that the large earthmoving machines which precede the residential community and commuter expressway will continue to leave raw banks and rivers of mud.

With a human population of about seven million, hundreds of factories, a completely canalized waterway artificially controlled by locks and dams and supporting an annual freight traffic of over 23 million tons, it is of little wonder that so little room remains for wildlife.

Gone now are the clear waters and many of the flood-plain lakes in which grew the native plants that wildfowl loved so well. In their place are waters darkened by tons of silt resulting from poor land use and further degraded by sewage and industrial waste until sunlight penetrates to a depth of only a few inches.

Gone, too, are the forests of oaks and other nut trees which provided a home for the partridge and turkey, and in their place are seasonal stands of corn. The endless grass prairie with its herds of buffalo and huge flocks of prairie chickens has long since fallen to man's progress.

Most recently large quantities of chemicals such as inorganic fertilizers, detergents, herbicides, and pesticides are being applied to the lands and waters. The effects of these complex substances on the native fauna and flora now appear to be a serious and, as yet, unexplored problem. Only time can fully evaluate the impact of these new creations, but if past history provides an insight it would appear that man is truly dedicated to destroying his own habitat.

Present Habitat Conditions

"The surest way to eliminate a species or a group of species is to destroy their habitat or produce environmental conditions unfavorable for them. The only way to maintain a species is to protect and maintain environmental conditions essential for and conducive to its growth, reproduction, and well being." (10)

Topography

The Illinois Valley is characterized by a broad level flood plain bounded in almost all places by steep-sided bluffs. Beyond the bluffs the monotonous prairie is broken into hilly segments only where a tributary stream occurs.

The watershed lies almost entirely within the area of glaciation and as the ancient ice sheets melted, their waters carved a valley much wider than is needed by the present day river. At a point some 45 mileswest of Chicago, where the Des Plaines and Kankakee Rivers join to form the Illinois, the flood plain is but a quarter of a mile wide. Flowing generally westward for almost 60 miles the valley widens only slightly. At Bureau, the river makes a spectacular right angle bend towards the south. Geologists tell us that from this point to the mouth at Grafton the Illinois follows a valley carved by the ancestral Mississippi. Here the flood plain gradually expands to a width of 5 miles at Beardstown and 9 miles near the mouth. Here, too, the gradient is reduced from over 1 foot per mile to less than 3 inches per mile. This condition leads to periodic and often violent flooding.

It is in this 140-mile stretch between Spring Valley and Meredosia that much of the remaining wildlife habitat of the Illinois is concentrated. Figure 20 is a photo of one of the flood-plain lakes valuable to water fowl and furbearers that still occur in this region.

Below Meredosia the river again takes on the appearance of a large ditch flanked on either side by drainage and levee districts. Figure 21 is a photo of a portion of the almost 175,000 acres of drained bottom land along the Illinois River.

Forest Cover

Although Illinois has always been known as the Prairie State, the river valley was once entirely forested (17). Now, except for fringes of timber along the streams and dikes and a few marshy strips, the bottom land, like the upland, is entirely agricultural. Map figure 22A shows the extent and type of present day woodlands in the Illinois Basin.

The bottom-land hardwoods consist mainly of willows, soft maple, elm, ash, sycamore, and birch, with some pecan and pin oak occurring in the most southerly area. Uplands support the oak-hickory type with plantings of white, red, and jack pine on the isolated areas of light, sandy soils. Remnants of the northern coniferous forest are found in the extreme northern part of the basin.

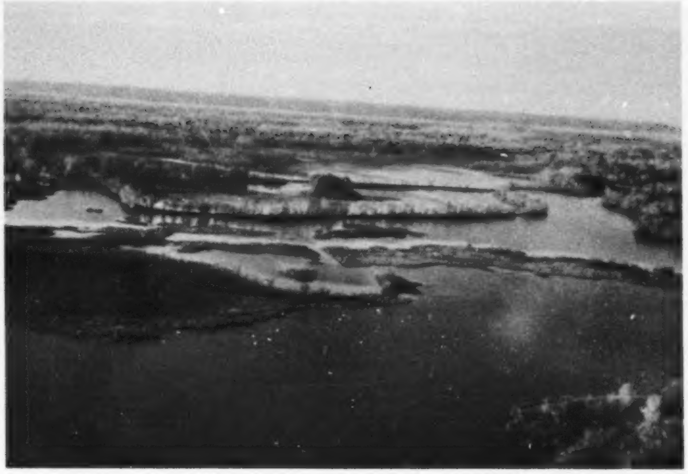


Figure 20. Flood-Plain Lake Habitat near Bath, Illinois

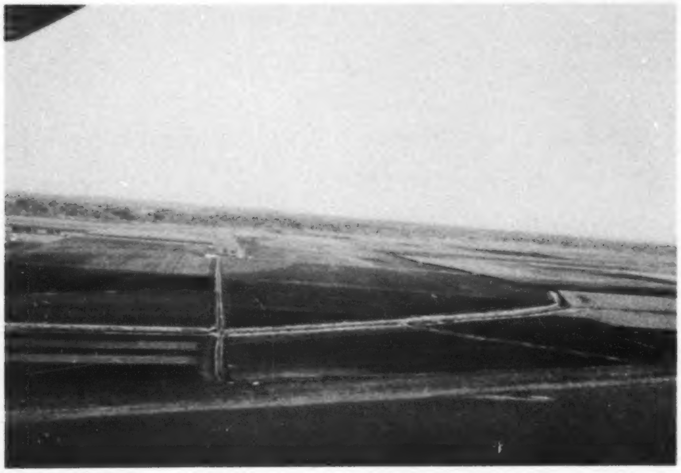
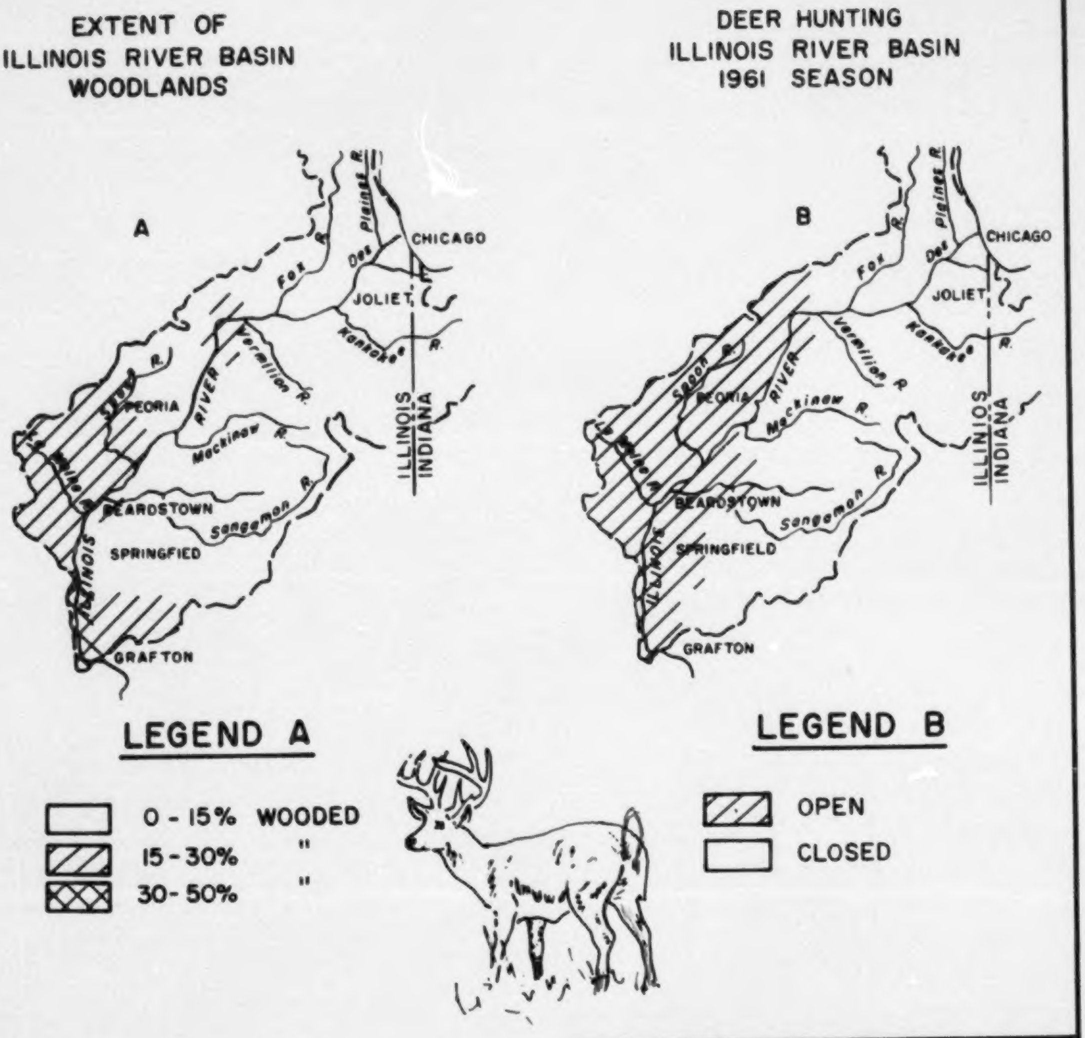


Figure 21. Drainage and Levee District Lands near Havana, Illinois



EXTENT OF
ILLINOIS RIVER BASIN
WOODLANDS
A
CHICAGO
Des Plaines R.
Fox R.
JOLIET
Kankakee R.
Vermilion R.
RIVER
Spoon R.
PEORIA
Mackinaw R.
La Moine R.
BEARDSTOWN
Sangamon R.
SPRINGFIELD
ILLINOIS
GRAFTON
ILLINOIS
INDIANA
DEER HUNTING
ILLINOIS RIVER BASIN
1961 SEASON
B
CHICAGO
Des Plaines R.
Fox R.
JOLIET
Kankakee R.
Vermilion R.
RIVER
Spoon R.
PEORIA
Mackinaw R.
La Moine R.
BEARDSTOWN
Sangamon R.
SPRINGFIELD
ILLINOIS
GRAFTON
ILLINOIS
INDIANA
LEGEND A
☐ 0 - 15% WOODED
▨ 15 - 30% "
▩ 30 - 50% "
LEGEND B
▨ OPEN
☐ CLOSED

GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

ILLINOIS WOODLANDS
AND DEER HUNTING

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

R.D.M 630930

FIGURE 22

Upland-Game Cover

Since the main stem of the Illinois River drains such a rich agricultural area, it is not too surprising to find that less than 5 per cent of this land area remains in low brush and herbaceous cover. This lack of cover in the flood plain and uplands alike precludes any large increase in the population of desirable small-game species. However, white-tailed deer are increasing in the limited areas of woodlands.

It is of interest to note that more "wild land" exists in and adjacent to the suburbs of Chicago than can be found anywhere else in the basin.

The following land-use chart (Table 6) covers the entire Illinois drainage area of almost 29,000 square miles.

Wetland and Aquatic Habitat

The aquatic environments furnish essential habitat for all waterfowl, most species of fur animals, and many other forms of wildlife.

Some 62,000 acres of water in ponds, sloughs and shallow lakes flank the river on both sides between Spring Valley and Meredosia. This is the heart of the duck habitat in the Illinois Valley. Although the quality of this area has diminished over the years, it still provides some of the best mallard shooting in the nation. The following list of Drainage and Levee Districts (Table 7), together with the acreages of each, clearly illustrates the large amount of former wetland habitat now of little value to wildlife.

TABLE 6.

LAND USE IN THE ILLINOIS RIVER BASIN - 1960

			% Rural land used for:			
Subbasin Designation	% Non-Rural	%Rural	Cropland	Pasture	Woodland	Other Land
N. Br., Chicago River	100	0	0	0	0	0
Mainstem, L. Mich. to Kankakee River	100	0	0	0	0	0
Calumet Rivers, Ind.	11	89	70	6	7	17
Calumet River, Ill. and Sag Channel	60	40	70	8	8	14
Des Plaines River	40	60	72	8	8	12
DuPage River	30	70	70	9	6	15
Kankakee River	6	94	78	5	7	10
Fox River	8	92	80	7	6	7
Vermilion River	4	96	89	6	2	3
Mackinaw River	5	95	77	8	10	5
Spoon River	6	94	67	14	14	5
LaMoine River	5	95	67	12	16	5
Sangamon River	5	95	84	8	5	3
Macoupin River	6	94	63	13	19	5
Mainstem, Kankakee River to Spoon River	6	94	80	7	9	4
Mainstem, Spoon River to Mouth	5	95	61	13	20	6

TABLE 7.

LOSS OF NON-AGRICULTURAL BOTTOM LAND BY DRAINAGE AND LEVEE DEVELOPMENT ALONG MAINSTEM ILLINOIS RIVER DRAINAGE AND LEVEE DISTRICTS

District	Acres
Hennepin	2,900
Pekin and LaMarsh	3,010
Rocky Ford	1,615
Spring Lake	13,120
Banner Special	4,569
East Liverpool	3,000
Liverpool	3,030
Lacey, Langellier, West Matanzan	7,800
Seahorn	1,500
Big Lake	3,290
Lost Creek	3,300
South Beardstown and Valley	10,300
Coal Creek	6,800
Crane Creek	5,420
New Pankey's Pond Special	1,703
Little Creek	1,800
Meredosia Lake and Willow Creek	8,116
Willow Creek	3,600
Coon River	4,600
Mauwaise Terre	4,040
Valley City	5,000
Scott County	10,500
Big Swan	12,300
Hillview	12,900
Hartwell	8,900
Keach	8,400
Eldred	10,548
Nutwood	11,300
TOTAL	173,361

True moist soil areas, which usually produce the more valuable food and cover plants, occur but rarely under natural conditions in this region. The profile of the river and flood plain is typical of most rivers subject to periodic flooding. A natural dike resulting from silt deposits is found along both banks. The basin on either side is very flat and often at or slightly below the level of the main stem. Floodwaters naturally impounded in these large areas remain at a very uniform depth. The waters of the river and the flood-plain lakes are generally very turbid and support little in the way of aquatic plants.

Wetland areas are of great importance to species of wildlife other than waterfowl. Almost every species uses these areas in varying degrees. The bottom-land lakes are the most valuable remaining areas of wildlife habitat and it is not enough simply to preserve them; we must also strive to improve and intelligently manage these areas.

Agriculture and Mining

Agriculture, more than any other activity of civilized man, has changed the wildlife environment.

This is an area of exceptionally "clean farming." Osage orange hedges, which once separated many fields, have long ago fallen to the axe and bulldozer so that another rod of land could be plowed. Good vegetative cover along fence rows, roadsides, and odd field corners rarely occurs in this region.

The principal crop is corn and it leads all others by a wide margin. Soybeans are a poor second; and when conditions permit, winter wheat is planted following harvest of a row crop. Also, when weather conditions permit, much of the land is fall plowed, which renders the waste grain unavailable to both upland game and waterfowl during the winter months.

With the exception of dairy operations near Chicago, animal agriculture is limited to poultry, hog farrowing, and hog and beef feed lot operations which require little in the way of grasslands or forage crops.

Only in the very isolated areas of poor soil are there any idle or "soil bank" farmlands. The many strip mining areas of the Illinois River Basin are of value to wildlife when suitable cover is established. The term strip mining refers to the recovery of a mineral, usually coal, from an open pit. The strip method of mining consists of removal of the overlying soil and rock material to expose the mineral. The topography of the resulting spoil material is a series of ridges with steep, short slopes subject to serious erosion and responsible for much of the silt in the nearby waters. Permanent water areas often occur in the pits or ravines left by the last cut. As the result of recent legislation requiring that lands affected by this type of mining be reclaimed, the Department of Conservation now has a Division of Open Cut Land Reclamation. Through the efforts of the Illinois Department of Conservation and local sportsmen's organizations, some of these "waste lands" have been revegetated with shrub, hardwood, and coniferous species adaptable to the unusual soils and topography. High utilization by most upland-game species of this habitat has proven the merit of such development work, and the many remaining strip mine areas offer a definite potential.

Wildlife Distribution, Status, and Trends

"Among the assets of mankind, wildlife receives its true appraisal only in advanced stages of civilization, when, owing to the heedless destruction of earlier times, it has been seriously if not irreparably reduced." (18)

Big Game

The white-tail deer is the only big game species occurring in Illinois. Present trends in population are one of the truly bright spots in the wildlife picture. As the result of an active management program, the first open season on deer since 1900 was possible in 1957. Deer numbers are now increasing well and should continue to do so, in proportion to the amount of available woodlands.

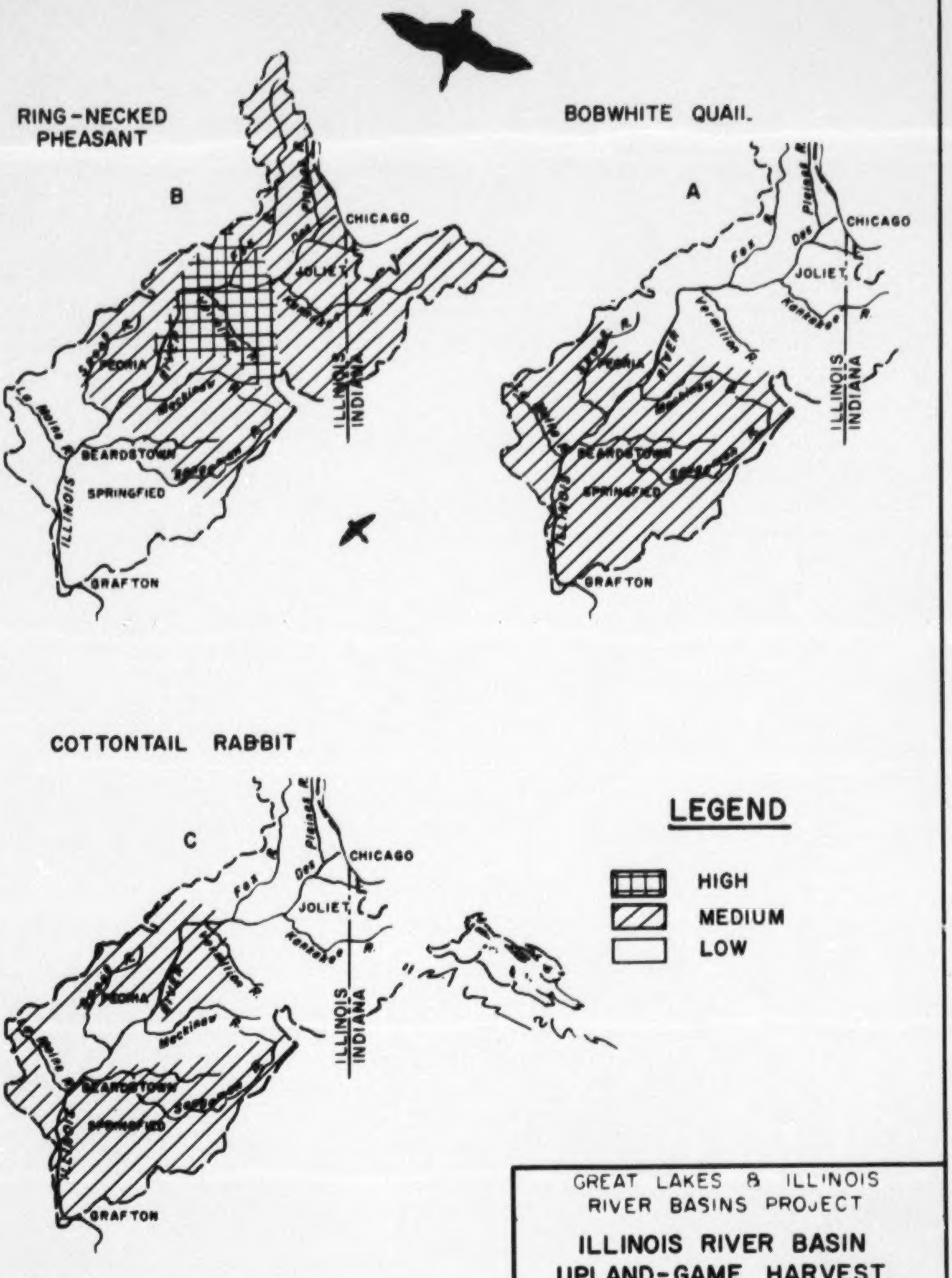
Principal deer concentrations along the main stem occur in Putnam and Marshall Counties, in the pine plantations and oak uplands of the Mason State Forest, in the Sangamon Bottoms, and in the unglaciated Lincoln Hills. Figure 22B shows the area open to deer hunting in the Illinois basin during the 1962 season.

Small Game

Although changed considerably from pioneer times, a good variety of resident or farm-game species is common to the valley.

Fair bobwhite quail numbers are found along the Illinois River from Peoria southward wherever suitable cover conditions exist. The response of this bird to habitat improvement, together with the limited home range of individual coveys, makes quail management very feasible for landowners desiring to increase quail numbers. Figure 23A illustrates the relative distribution of quail in the Illinois Basin.

Fair to good ring-necked pheasant populations occur along the Illinois River north of Peoria, but areas subject to seasonal flooding along the


RING-NECKED PHEASANT
B
BOBWHITE QUAIL
A
COTTONTAIL RABBIT
C
CHICAGO
JOLIET
PEORIA
BEARDSTOWN
SPRINGFIED
GRAFTON
Fox R.
Des Plaines R.
Kankakee R.
Vermilion R.
Mackinaw R.
Spoon R.
La Moine R.
Sangamon R.
Illinois River
ILLINOIS
INDIANA
LEGEND
▦ HIGH
▨ MEDIUM
☐ LOW

GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

ILLINOIS RIVER BASIN
UPLAND-GAME HARVEST

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

R.D.M. 631002

63a

FIGURE 23

main stem do not support many pheasants. This is the only game bird which has been able to adapt itself to the intensive type of agriculture practice on the better soils. Figure 23B shows the range and distribution of the pheasant in the basin (19).

A very limited Hungarian partridge population exists only in three or four counties in the northeastern corner of the state and is an extension of the southern and eastern range of this bird in Wisconsin.

Ruffed grouse and wild turkey -- common to the Illinois Valley in bygone days -- are no longer present. Attempts to re-introduce ruffed grouse and wild turkey have been reasonably successful in other regions of Illinois where suitable habitat exists. Isolated areas of potential ruffed grouse habitat can be found along some of the tributary streams and along the main stem of the Illinois in the Mason State Forest and downstream from Hardin to the mouth. As yet, no releases have been attempted in these areas.

Only the eastern cottontail is present throughout the state and is the only rabbit of importance in the Illinois Valley. The fact that numerically this rabbit accounts for about 40 per cent of the annual game bag attests to its popularity. However, hunting is not a significant factor in cottontail management since annual natural mortality and predation, especially in marginal habitat, will normally eliminate over 75 per cent of the populations. Here again, amount and distribution of suitable cover is the limiting factor in the Illinois River Basin. Figure 23C shows the harvest of cottontails in the basin.

Both fox and grey squirrels are found throughout the Illinois River basin. While the fox squirrel inhabits most wooded areas, including small, grazed woodlots and hedgerows, the grey squirrel is restricted to the more heavily forested areas with brushy undergrowth. Principal grey squirrel habitat occurs along the river bluffs and unprotected bottomlands of the Illinois River and its tributaries (20).

Although both red and grey foxes are present in the Illinois basin, the red is by far the most abundant.

Woodchucks, opossums, and skunks are also common to abundant along the Illinois but are, at present, of almost no interest to either hunter or trapper.

Fox and coon hunters occur throughout the basin, but these forms of hunting are most popular along the wooded bluffs of the Lower Illinois and Mississippi River. The raccoon, for the past several years, has been very abundant along the Illinois River. The density increases with the amount of timber available; however, populations are quite high even in the comparatively treeless prairie area of the basin where the coon finds a bountiful supply of food among agricultural products of the farmlands.

Although generally classified as furbearers in the past, the value of fox and coon pelts has declined so greatly in recent years that the sporting aspects have become relatively more important.

Along the Illinois River, the raccoon population is high enough to cause a serious predation problem. Of particular importance is the high incidence of raccoon predation on wood duck nests.

Furbearers

Much of the early exploration of the Illinois River was for the purpose of expanding the fur trade. The streams and adjacent lakes and marshes produced an abundance of fur as well as other forms of wildlife. Although the fur quality was not quite so high as that of fur animals trapped in more northerly areas, the pelts were an important product of the area until the aquatic habitat began to deteriorate. Fur trapping is of relatively minor importance today.

Higher muskrat populations are found in the Glacial lakes region and along the Rock River in northern Illinois than occur along the Illinois River. Fluctuating water levels and lack of vegetation growth in areas of stable water prohibit high rat densities (21). However, the muskrat is by far the most important furbearing animal of the valley.

Trapping pressure fluctuates to a great degree with the fur market, which has been quite low for several years. This lack of harvest has not resulted in a corresponding increase in the rat populations since periodic floods, as well as a lack of high quality habitat, prevent any substantial buildup. Although ditches of the drainage and levee areas provide some muskrat habitat, they in no way compensate for the vast water areas eliminated by drainage.

Trapping records indicate a rather moderate and uniform mink population throughout the Illinois Valley. Here again harvest is related to both abundance and market value of the pelt. The decline of fur prices since World War II has also resulted in decreased interest in mink trapping.

Although the beaver never reached the importance it did further north, the species was once common throughout the valley. The early destruction of the bottom-land forest, together with overtrapping, rapidly decimated the population. The last beaver was reported in the Illinois River in 1912.

In 1929 the beaver was re-introduced in the lower Illinois Valley and has increased in numbers until now this fine fur animal is common and on the increase throughout the lower half of the River. Beaver colonies are, of course, located only where suitable habitat exists, but a liberal trapping season is again allowed. Beaver damage is occasionally a problem to landowners and commercial fishermen.

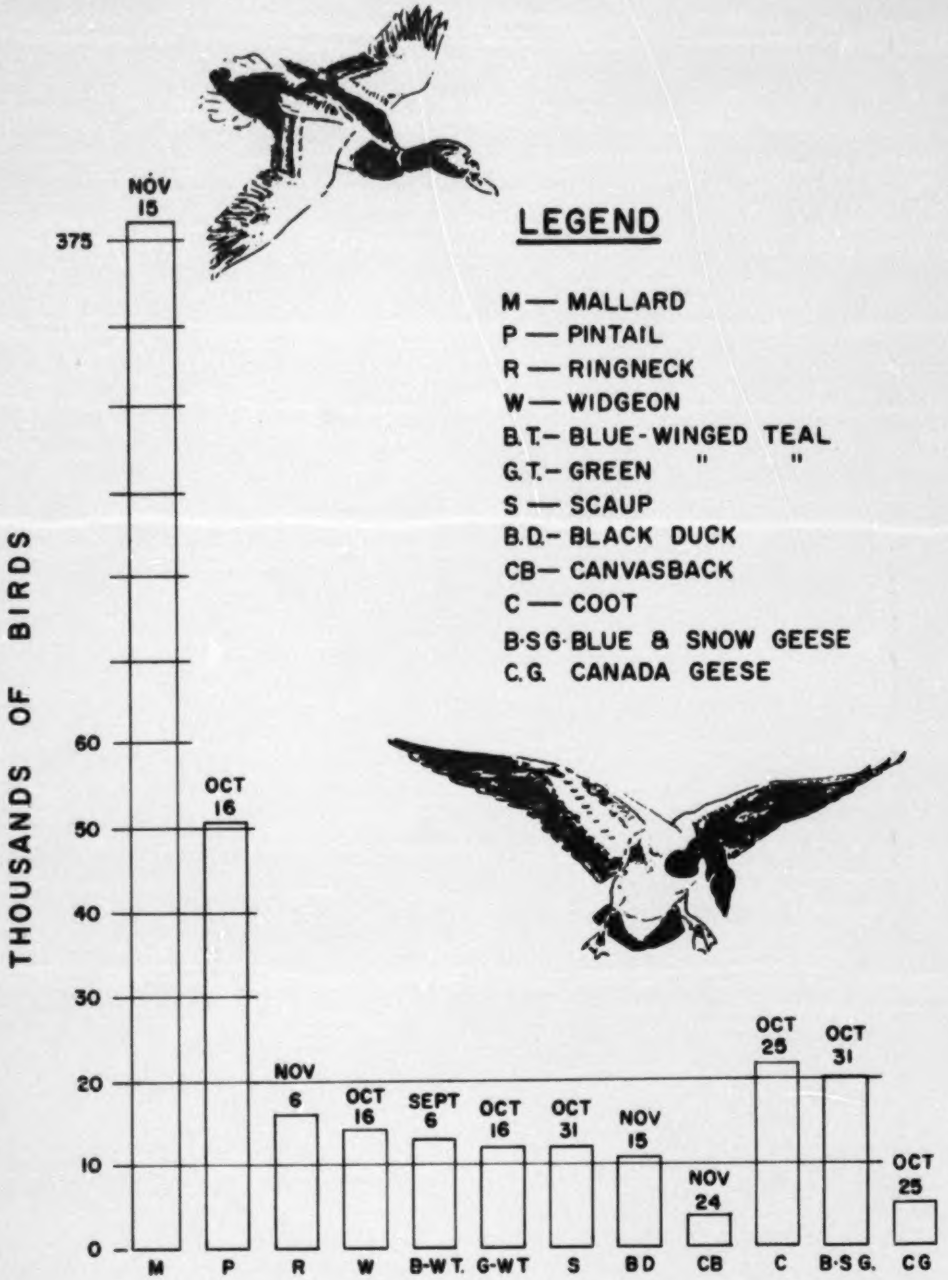
Migratory Game Birds

Of the many species of wildlife common to the Illinois River Valley migratory waterfowl, as a group, are the most spectacular and of the greatest interest to the hunter.

Although a few mallards and an occasional blue-winged teal nest in this region, only the wood duck can be classified as a common nester. In fact, areas of the Illinois River bottoms have higher concentrations of nesting wood ducks than almost any other region in the Mississippi Flyway. As a result of overhunting and widespread destruction of bottom-land timber, this beautiful species was brought to the point of extinction in the early 1900's. In response to complete protection from 1918 to 1941, very limited hunting since 1941, and better management of nesting areas, the wood duck appears to be slowly increasing (22). The phrase "beautiful but dumb" characterizes this duck and it will never be able to sustain itself under heavy gunning pressure. It commonly nests in the cavities of large, over-mature trees and, since available nesting sites are a limiting factor, it is of special interest to note that considerable work has been done by the Illinois Natural History Survey on the development, erection, and evaluation of various types of wood duck nesting boxes.

By far the most abundant species of waterfowl found in the Illinois River Basin is the mallard. During the fall migration the converging rivers of Iowa and northern Missouri, together with the mighty Mississippi, lead large numbers of waterfowl into the lower Illinois Valley. In days gone by mallard numbers alone on the Illinois from Spring Valley to Grafton have been estimated at over 3 million birds on a single day. The lower Illinois River area thus acts as a bottleneck in the Mississippi Flyway and is also a region of large separate blocks of waterfowl habitat which facilitate an accurate waterfowl census. Figure 24 shows the waterfowl migration pattern by date and major species (23). Other species of ducks occurring regularly but in smaller numbers are gadwall, shoveller, and redhead. The wood duck does not appear on this chart because accurate aerial census of this species is not possible.

The "grain feeders" -- mallards, pintails, and black ducks -- constitute over 80 per cent of the migrant duck population using the Illinois River. Food habits studies have shown that waste corn forms a major portion of their diet in most years. Corn utilization varies with the abundance of natural aquatic foods and the time relationship between corn harvest and fall migration. Mallard numbers will remain at a high level in this area



GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

PEAK NUMBERS OF WATERFOWL
ILLINOIS RIVER
FALL 1961

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

R.D.M. 631003

68a

FIGURE 24

throughout much of the winter when lack of snow cover allows them to feed in the fields.

However, native aquatic and moist soil plants are the backbone of the duck's food supply. Each species of duck shows a definite preference for a particular plant or group of related plants. Some species, such as the lesser scaup, feed heavily on a particular form of aquatic animal.

A food preference list weighted for duck numbers and availability for the Illinois Valley is as follows: (24)

(1) Corn (mallards and pintails)
(2) Rice cutgrass (mallards and pintails)
(3) Coontail (widgeon and gadwall)
(4) Millets (mallards and pintails)
(5) Nut grasses (teal)
(6) Smartweeds (mallards)
(7) Pondweeds (canvasback and redheads)

Various factors having a deleterious effect on the growth and seed production of aquatic and moist soil plants are: fluctuating water levels, turbidity, pollution, wind action, bottom-feeding fish, and soil composition (25).

During the era of baiting and live decoys around 1920, some areas of the Illinois Valley became famous for goose hunting. Figure 25 is an old photo of goose hunters during this period. Prohibition of these practices, together with the establishment of large goose refuges to the south, brought an end to the good shooting. Fairly large numbers of blue and snow geese, along with lesser numbers of Canadas, continue to stop and rest on the larger lakes and refuge areas of the Illinois River; however, they provide little shooting. Figure 26 is a recent photo of geese flying along the River.

Since much of the area now occupied by Chicago and its suburbs was once prime waterfowl habitat, it is not too surprising to find the highly adaptable mallard living quite close to this urban complex. Areas which hold fair mallard numbers are Saganashkee Slough along the Calumet-Sag Channel and McGinnes Slough along Highway 45 near Orland Park. These are refuge areas in the Cook County Forest Preserve but feeding flights to the south and west offer some cornfield shooting.

Public and private shooting areas at the junction of the Des Plaines and Kankakee Rivers provide additional waterfowl habitat easily accessible to the city dwellers.

Trends in the waterfowl population using the Illinois River Valley naturally follow the general patterns of the Mississippi Flyway. Since the mallard is by far the most numerous duck of both the Flyway and the Illinois Valley, these larger numbers tend to obscure some rather significant changes. First of all, the proportion of Flyway mallards using the Illinois River has been steadily decreasing. This is particularly true of specific areas of habitat in the Illinois Valley where the quality has been slowly degenerating.

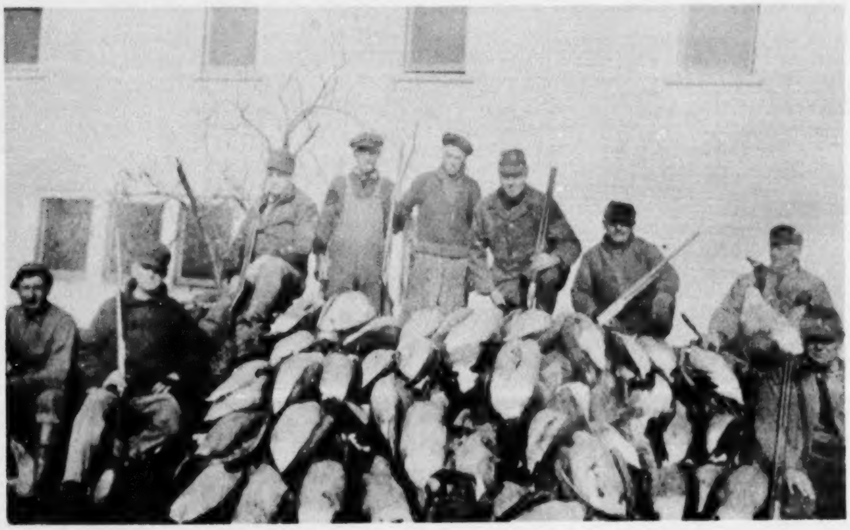


Figure 25. A 1920 Goose Hunt
Photo courtesy Mr. Harry Walker, Beardstown, Illinois

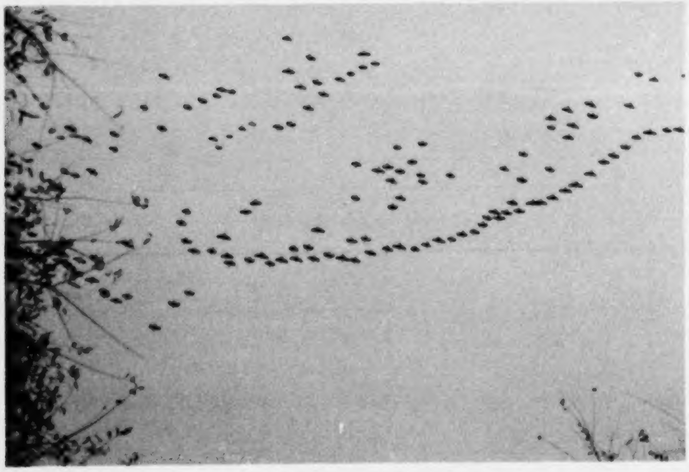


Figure 26. An Evening Feeding Flight of Canada Geese
Along the Illinois River

Secondly a drastic reduction of some species in proportion to their relative flyway abundance has taken place. This is most evident in species having very specific food requirements. Figure 27 shows the rapid decline of scaup using the Illinois which coincided with the decline of the fingernail clam, the major item in their diet.

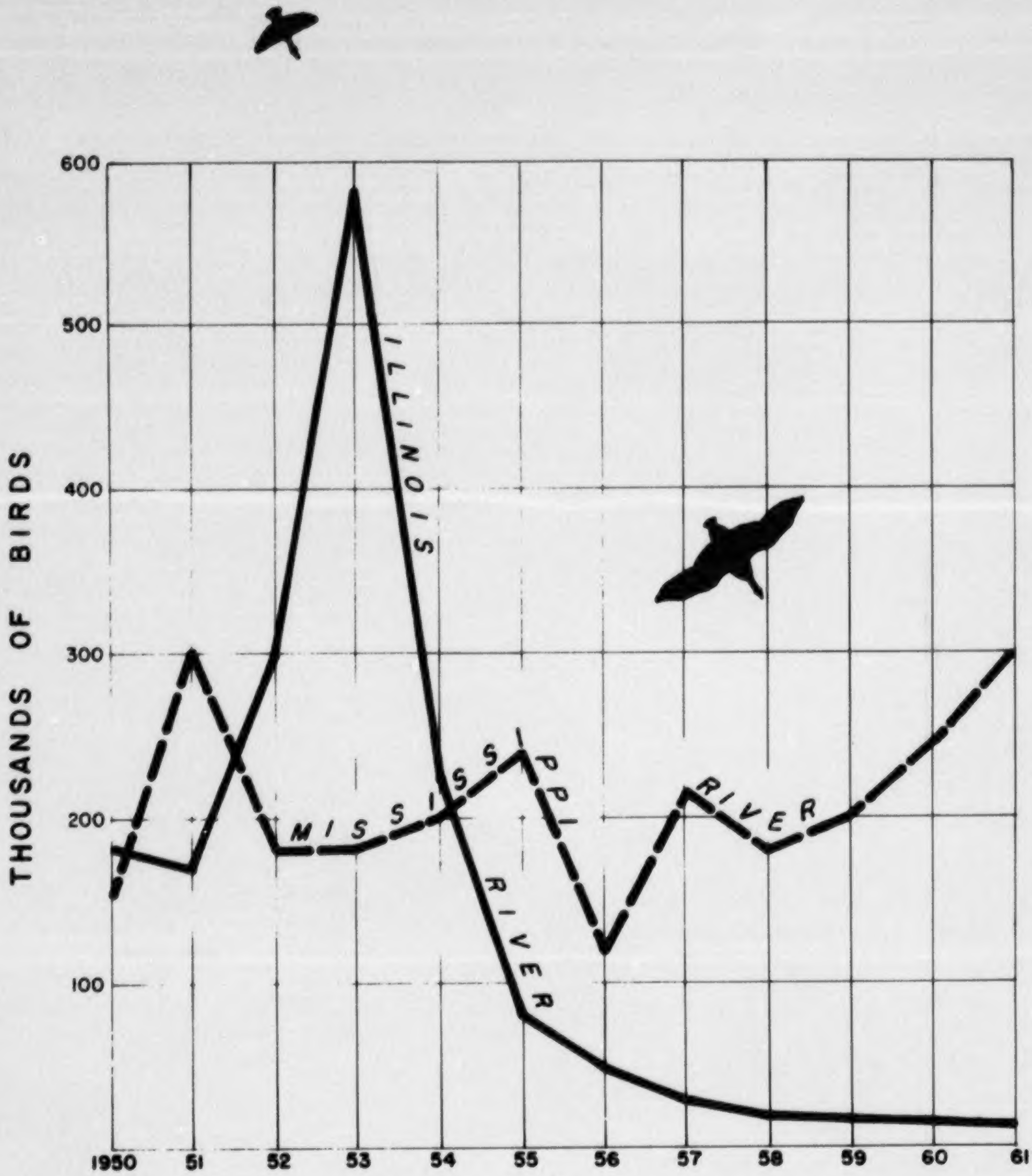
With the exception of the Canada goose, general waterfowl trends for both the Flyway and Illinois are discouraging. Loss of habitat and degrading of habitat quality occurs at a more accelerated rate as urbanization and industrial expansion takes place.

Illinois is the northern-most state in the midwest having an annual hunting season on mourning doves. Although this species is very popular with hunters and thousands are harvested annually, data from breeding population surveys indicate a steady increase of doves in the Illinois River Basin for the past several years, as shown in the graph Figure 28.

Woodcock and Wilson snipe are neither plentiful nor popular in the Illinois Valley although an open hunting season is available on both. Neither species nests in the valley to any appreciable extent and due to lack of habitat, migrants do not linger.

Non-Game Species

Of particular importance along the Illinois River is the preservation and improvement of the rapidly disappearing habitat type used by shorebirds and wading birds. The disappearance of several traditional heron and egret rookeries reflects the inability of the present environment to satisfy the needs of these birds.



GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

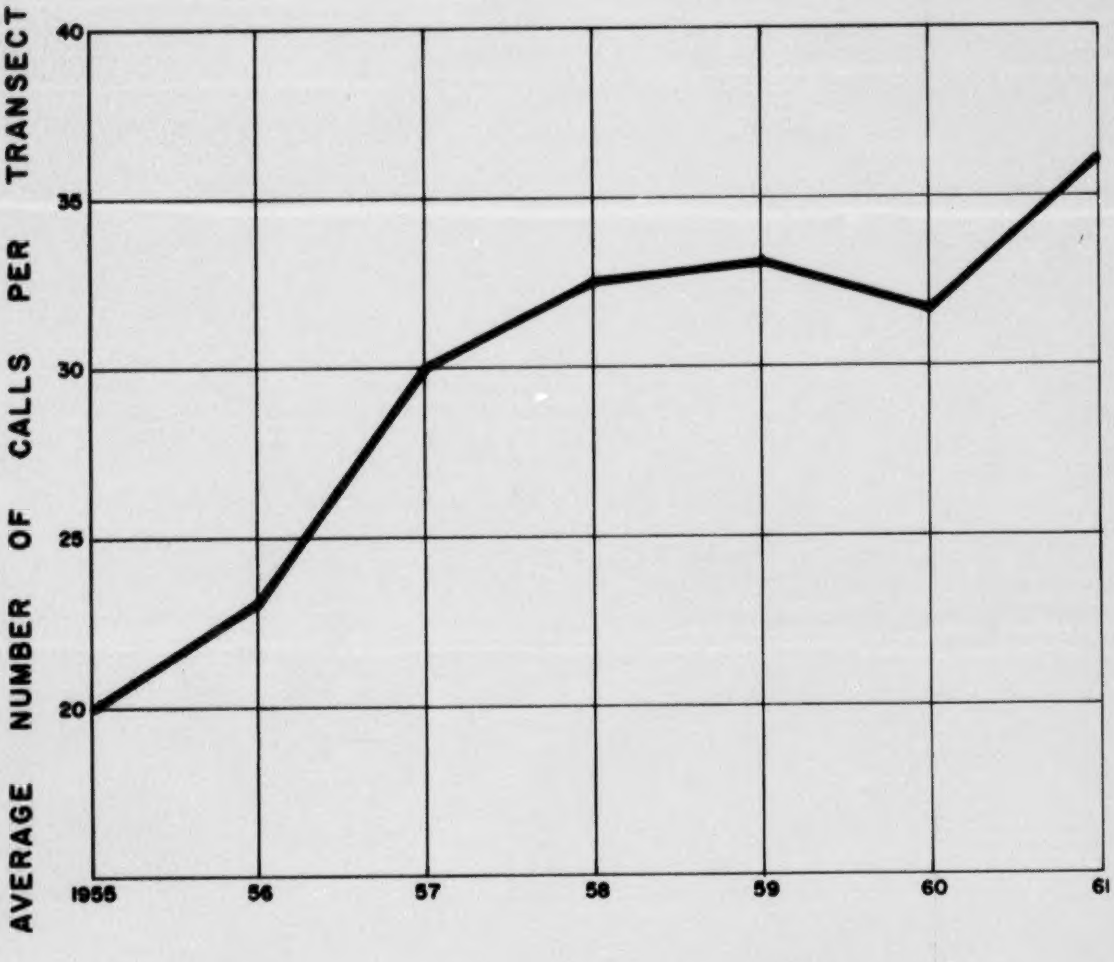
PEAK NUMBERS OF SCAUP
ILLINOIS & MISSISSIPPI RIVER
1950-61 FALL MIGRATION

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

R.D.M. 631001

7/a

FIGURE 27



GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

NESTING MORNING DOVE TREND

ILLINOIS
1955 - 1961

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

R. D. M. 631003

71b

FIGURE 28

Present Use of Wildlife Resources

Hunting

Illinois has always been one of the nation's leading waterfowl hunting states. In terms of duck stamp sales (Table 8), it has never ranked lower than fourth in the Mississippi Flyway, and only California and Texas surpass Illinois outside the flyway:

Table 8. Illinois Rank in Mississippi Flyway, Waterfowl Stamp Sales from 1934 to 1961

	Illinois	Rank in Mississippi Flyway	Mississippi Flyway
1934-35	42,687	2	266,649
1935-36	36,337	2	205,967
1936-37	53,251	2	303,737
1937-38	51,333	4	383,433
1938-39	57,538	4	493,302
1939-40	66,434	4	536,951
1940-41	64,212	4	566,894
1941-42	84,997	4	632,227
1942-43	83,391	4	622,497
1943-44	66,587	3	510,339
1944-45	69,891	4	593,079
1945-46	77,452	4	692,673
1946-47	93,387	4	824,751
1947-48	81,753	4	719,566
1948-49	110,980	2	874,547
1949-50	106,767	2	824,693
1950-51	94,062	3	786,547
1951-52	114,836	2	919,239
1952-53	119,873	4	989,059
1953-54	114,914	4	887,482
1954-55	110,507	4	922,082
1955-56	125,185	4	1,019,145
1956-57	117,650	4	1,022,695
1957-58	119,010	3	1,004,555
1958-59	108,456	4	931,544
1959-60	85,902	3	707,649
1960-61	78,722	4	746,643

State-controlled public hunting areas may be separated into three general categories. All hunting is done from registered blinds; however, on some areas, the State actually builds the blinds and hunters are chosen by drawing names from mailed-in applications. On other areas the individual hunters build their own blinds and have a location priority which is maintained from one hunting season to the next. Under a third system, blind building sites are assigned on an annual drawing basis. Registered blind builders and permit holders must arrive on the area to claim their blinds one hour before shooting time. Unclaimed blinds at that time are then assigned to waiting hunters by drawing numbers. Figures 29, 30, 31 and 32 depict some of the activities on the managed waterfowl areas.

Hunter interest and use of the public areas (Tables 9 and 10) varies with the type of season and the waterfowl population. Although blinds are usually filled on weekends, mid-week hunters often have no difficulty in securing a blind and many blinds may remain unoccupied.

Commercial waterfowl hunting "clubs" along the Illinois River have been decreasing for several years and are now relatively few in number. The daily fee charged on these areas shows a wide variance depending on quality of the operation and the relationship of supply to demand. It is possible to find small operators charging only $5 per day while more elaborate operations may run as high as $25 per day. Besides differences in the quality of the shooting, extras such as decoys, dogs, and guides may account for the price difference.

Although a fee is also charged ($3 per day) on some of the public areas, the increase in their availability due to such factors as additional areas purchased or leased, reduction in hunting pressure and competition

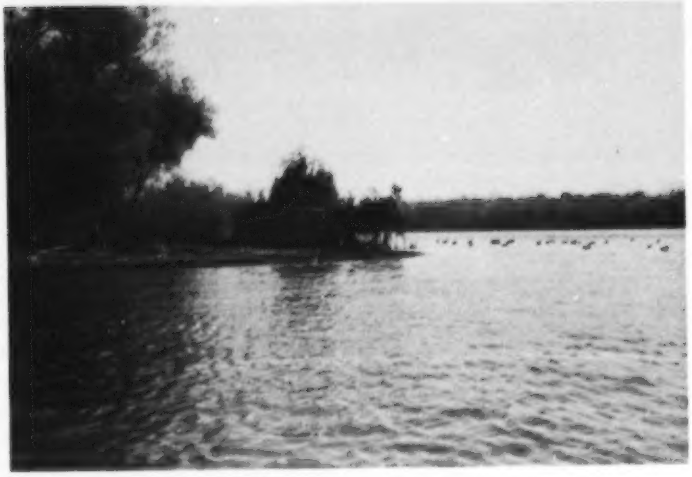


Figure 29. A Public Duck Blind on the Illinois River

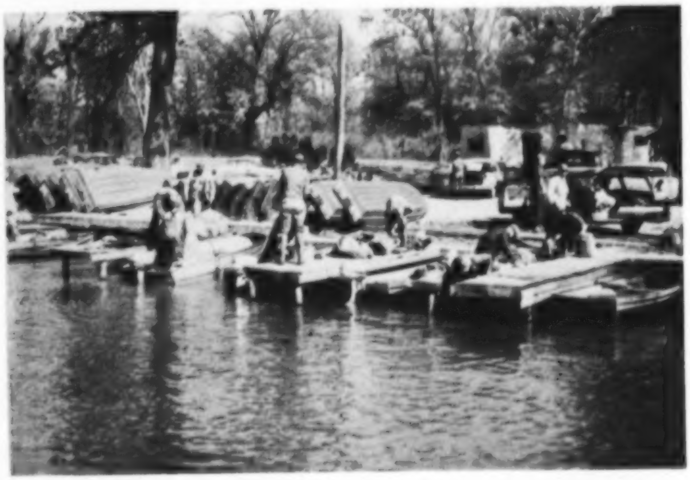


Figure 30. Duck Hunters of the Stump Lake Management Area

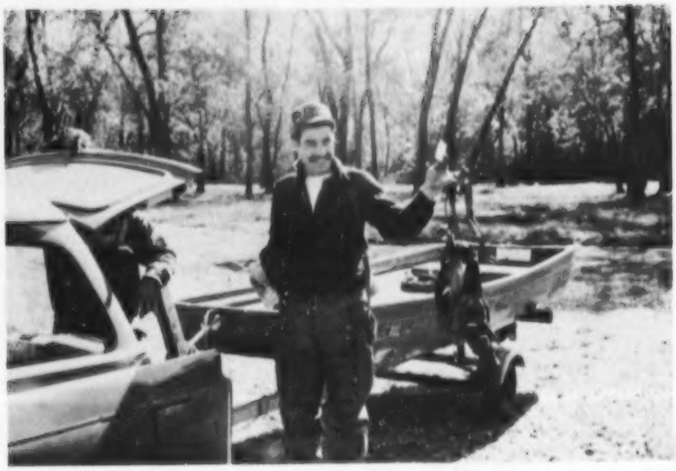


Figure 31. A Satisfied Duck Hunter at Stump Lake

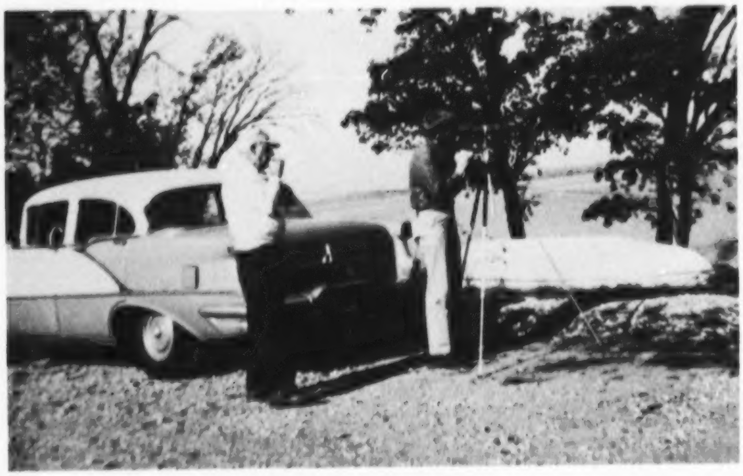


Figure 32. Waterfowl Observation - A Popular Form of Recreation on the Chautauqua National Wildlife Refuge

for blinds, and more rapid transportation from metropolitan areas has resulted in many of the commercial areas becoming less than profitable.

Table 9. Relationship of Hunting Licenses and Duck Stamp Sales for Illinois - 1936 to 1961

Year	Ill. Resident Hunting License Sales	Ill. Duck Stamp Sales	% of Hunter w/Waterfowl Stamps
1936-37	273,124	53,251	19.5
1937-38	294,024	51,333	17.5
1938-39	323,218	57,538	17.8
1939-40	No data	66,434	--
1941-42	341,522	84,997	24.9
1942-43	322,543	83,391	25.9
1943-44	266,990	66,587	24.9
1944-45	298,434	69,891	23.4
1945-46	323,976	77,452	23.9
1946-47	432,868	93,387	21.6
1947-48	414,900	81,753	19.7
1948-49	467,487	110,980	23.7
1949-50	499,584	106,767	21.4
1950-51	492,138	94,062	19.1
1951-52	495,746	114,836	23.2
1952-53	493,175	119,873	24.3
1953-54	518,950	114,914	22.1
1954-55	510,446	110,507	21.6
1955-56	523,772	125,185	23.9
1956-57	550,308	117,650	21.4
1957-58	505,949	119,010	23.5
1958-59	507,737	108,456	21.4
1959-60	496,696	85,902	17.3
1960-61	476,613	78,722	16.5

Hunting pressure on upland-game species also varies with the amount of available habitat; however, in comparison with the waterfowl hunter, the upland game hunter has over 30 times more area in which to participate in his sport.

Several public hunting areas are provided for the upland-game hunter, the largest of which lies but a short drive from Chicago near the junction of the Des Plaines and Kankakee Rivers. This Des Plaines area receives heavy use (Table 11) and is regularly stocked with pen-reared pheasants by the Illinois Department of Conservation.

Table 10. Hunter Use and Harvest Data for three Public, Waterfowl Hunting Areas - 1954 to 1962

Area	Hunters	Ducks Killed	Ducks Bagged/Hunter
Anderson Lake - 1954	1,377	2,158	1.57
1955	1,079	2,430	2.25
1956	1,046	1,234	1.18
1957	1,633	2,338	1.43
1958	1,358	1,720	1.27
1959	602	903	1.50
1960	1,088	1,321	1.21
1961	973	630	0.65
1962	438	380	.87
Rice Lake - 1954	1,740	2,876	1.65
1955	1,407	2,869	2.04
1956	1,641	2,910	1.77
1957	1,896	3,290	1.74
1958	2,717	2,598	0.96
1959	766	867	1.13
1960	1,298	1,145	0.88
1961	889	1,004	1.13
1962	516	212	.41
Sanganois - 1954	706	527	0.75
1955	439	239	0.54
1956	386	102	0.26
1957	1,510	2,063	1.37
1958	1,149	786	0.68
1959	658	442	0.67
1960	876	995	1.14
1961	358	251	0.70
1962	224	252	1.13

Table 11. Hunter Use and Harvest, Des Plaines Public Upland Game Hunting Area 1954 to 1962

Year	Hunters	Pheasants Killed	Rabbits Killed	Pheasants Released
1954	4,461	6,238	296	
1955	4,709	7,998	134	
1956	6,039	8,038	No data	
1957	6,357	8,809	--	
1958	6,426	9,708	499	11,600
1959	6,377	8,812	1,129	11,500
1960	6,756	10,475	921	11,800
1961	5,367	8,243	2,639	10,300
1962	5,332	8,316	No data	9,850

Most upland-game hunting in the Illinois River Valley is restricted to pheasants, quail, squirrels, rabbits and doves.

The rapidly increasing deer herd has resulted in longer hunting seasons, additional open areas and larger kill quotas over the past several years. Interest in deer hunting has likewise increased yearly. The Illinois Deer Permit Office issued 30,462 shotgun permits for the taking of one deer of any age or either sex during the 6 day season of 1962. The resultant harvest of 6,289 animals and a computed success ratio of one deer for each 5 hunters attests to the present popularity of deer hunting in Illinois. In addition, bow hunters purchased 4,292 permits with a reported kill to date of 163 deer.

Trapping

As previously stated, trapping pressure is relatively light due to low fur prices. The greatest majority of the trapping is done by landowners or tenants on their own property, in which case a license is not required.

Wildlife Observation

Managers of all types of Public-Use Areas state that each year more visitors come primarily to observe our native wildlife. To this already large and rapidly growing segment of outdoor enthusiasts non-game species are often of more importance than the game species.

Projected Future Use to Year 2010

". . . . the sportsman of the future must get his satisfaction by enlarging himself rather than by enlarging his bag." (22)

The following table showing past population trends and future predictions will serve as a basis for estimating hunter numbers and needs 50 years from now.

Table 12.

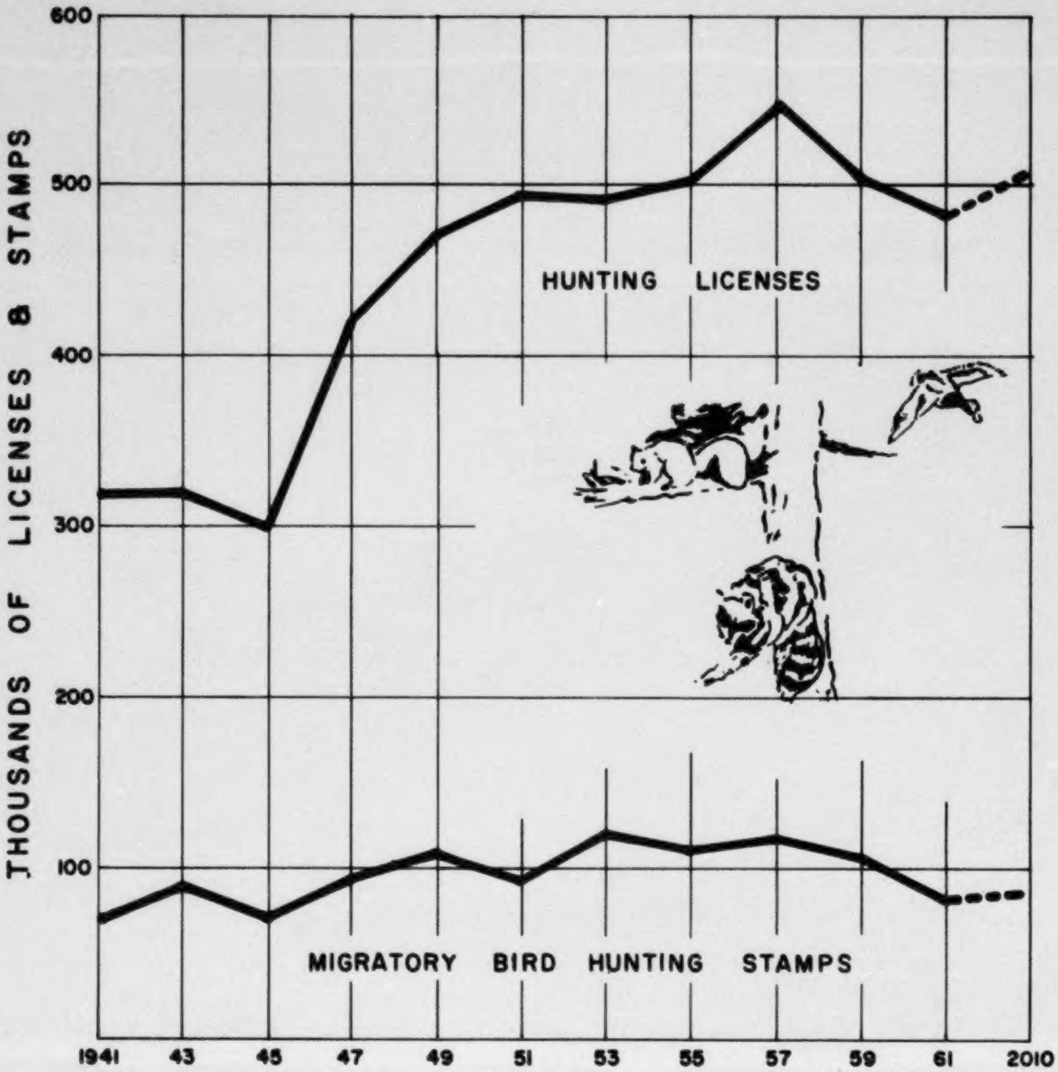
Census Data, Illinois River Mainstem Counties, 1910 to 1960, with Projected Figures to the Year 2010

Counties	1910	1940	1950	1960	Urban 1960	2010	Urban 2010
Lake, McHenry, Cook DuPage, Kane, Will	2,702	4,569.6	5,177.9	6,220.9	5,917	13,000	13,000
Kendall, DeKalb, LaSalle	134	143.3	153.5	180.0	129	320	250
Kankakee, Iroquois, Grundy, Livingston	141	150.6	162.8	188.4	111	330	270
Bureau, Putnam, Marshall, Woodford	89	75.2	76.7	80.1	42	95	45
Peoria, Tazewell	134	211.8	250.5	288.8	224	630	550
Stark, Knox, Fulton	106	105.7	106.8	111.5	82	130	110
McLean, DeWitt, Logan Mason, Menard, Ford	164	162.6	165.0	175.9	125	240	170
Cass, Morgan, Scott	61	61.0	57.9	57.5	41	65	45
Greene, Macoupin Jersey	87	80.2	78.3	78.0	50	90	60
McDonough, Schuyler Brown	52	46.4	44.9	43.8	27	55	35
	3,670	5,606.4	6,274.3	7,424.9	6,748	14,955	14,535

It is readily apparent from Table 12 that the economists predict a continuation in our present trends toward urbanization as well as population growth. Although the number of licensed hunters is about the same as it was 10 years ago and has actually declined since the high of 1957, it would appear for the purpose of long range predictions that we must assume a large increase in numbers of potential hunters. Figure 33 presents graphically the trend in hunting licenses and waterfowl stamp sales since 1941.

A study of the factors which might influence this trend may help in providing for future growth. First of all, it can be safely stated that with respect to waterfowl hunting there would be many more hunters participating right now if there were more ducks, longer seasons, larger bag limits, and more hunting areas available. Therefore, it is doubtful that increases in the human population alone will have any great effect on the number of duck hunters. Beneficial changes in any or all of the above factors would immediately make duck hunters of persons not now participating. More than any other form of hunting, shooting of waterfowl requires a specific area of suitable habitat for each shooter. Large numbers of hunters cannot be accommodated on the limited amount of habitat without destroying the quality of the hunting to the point where discouraged duck hunters turn to other forms of recreation. This, however, is not the situation at present in Illinois. The present lack of interest in waterfowl hunting is not due to a scarcity of potential duck hunters, but to a reduced supply of ducks and the necessary restrictions imposed on the hunter to conserve the remaining waterfowl.

Duck populations are, to a large extent, governed by water conditions on the major breeding grounds. Recent drought conditions are of a temporary nature and improved water conditions will result in an immediate increase



GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

RESIDENT HUNTING LICENSE & MIGRATORY BIRD HUNTING STAMP SALES IN ILLINOIS 1941-1961

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

R. D. M. 631002

FIGURE 33

in the waterfowl populations and a corresponding increase in the number of duck hunters.

The National Survey of Hunting and Fishing of 1960 indicated that smaller percentages of urban population hunted than did the rural population. Although the population prediction shows an increase of almost 7 million people, it also indicates a net loss in the rural population of almost 500,000.

Other factors are in evidence in our larger department stores where the record shop is larger than the gun department and the TV sets occupy considerably more space than the sporting goods. It would appear that our national pastime has become watching.

Nevertheless, there is going to be an increase in the number of waterfowl hunters during the next 50 years, but considering all the factors, it would appear that active waterfowl hunters in this area are likely to increase at a lesser rate than the total population.

Upland-game hunters on the other hand, could become considerably more numerous, since more diversification is possible and a considerably less critical space problem exists. In addition, the danger of overharvesting the supply of upland game is not nearly as apparent as is true of migratory ducks. Many species of upland-game birds and animals are actually underharvested from present hunting pressure. Therefore, increased hunting pressure in the near future should not require the type of restrictive regulations already necessary on waterfowl. There has also been a recent large increase in the number of women hunting both upland game and deer.

These factors together with those discussed under waterfowl would yield an increase in the number of upland-game hunters more in proportion to expected total population.

In spite of the fact that Table 13 shows a rather drastic reduction in the number of licensed hunters in the counties bordering the Illinois Waterway from 1955 to 1960, there are several reasons for believing that this trend is temporary. While the National Survey showed a decrease in the number of waterfowl hunters from 1955-1960, it also showed a rather large increase in the number of small game hunters. Since waterfowl hunting is more popular in the Illinois Valley than it is on a national scale, the drop in the Illinois general license sales reflects in some measure the drop in the duck population.

Referring again to Table 13, it can be seen that the counties of DuPage, Kendall, Will, and Tazewell show a steady increase in hunting license sales. These are the counties near Chicago, Joliet, and Peoria which have experienced the type of urban and suburban growth which will be steadily increasing over the next 50 years.

Table 13. Hunting License Sales for Illinois Counties having Mainstem Frontage

County	1951	1955	1960	From 1951 to 1960	From 1955 to 1960
Brown	503	678	652	+	-
Bureau	3,680	3,841	2,892	-	-
Calhoun	727	1,291	1,027	+	-
Cass	1,869	2,034	1,673	-	-
Cook	93,274	97,700	84,939	-	-
DuPage	6,674	8,084	8,311	+	+
Fulton	4,350	4,244	3,864	-	-
Green	2,015	2,154	1,941	-	-
Grundy	2,138	2,568	2,220	+	-
Jersey	1,452	1,655	1,514	+	-
Kendall	968	1,156	1,244	+	+
LaSalle	10,453	12,041	10,183	-	-
Marshall	1,620	2,114	1,657	+	-
Mason	2,580	2,663	2,559	-	-
Morgan	2,970	3,062	2,763	-	-
Peoria	15,073	15,231	13,823	-	-
Pike	2,225	2,913	2,839	+	-
Putnam	482	633	579	+	-
Schuyler	551	691	724	+	+
Scott	549	656	634	+	-
Tazewell	9,031	9,752	9,818	+	+
Will	9,651	11,691	11,731	+	+
Woodford	2,462	2,535	2,231	-	-
Totals	175,297	189,387	169,818	-	-

If wildlife management agencies are to keep pace with the expected population growth, considerably more money and effort must be expended in improving the quality of remaining wildlife habitat, for only through intensive rehabilitation and management can the demand per unit of land and water be met.

The increased popularity of the privately operated "Daily Fee Shooting Preserve" in northern and central Illinois would seem to indicate that more hunting opportunity is desired by the shooter than can be presently found under natural conditions. Shooting preserves have reached a high degree of development in this area. Many of them offer mallard shooting in addition to several species of upland birds, and although hunting courses and blinds usually approximate actual field conditions, it is not likely that they will effectively reduce the necessity of providing quality hunting for the average sportsman.

Management Areas

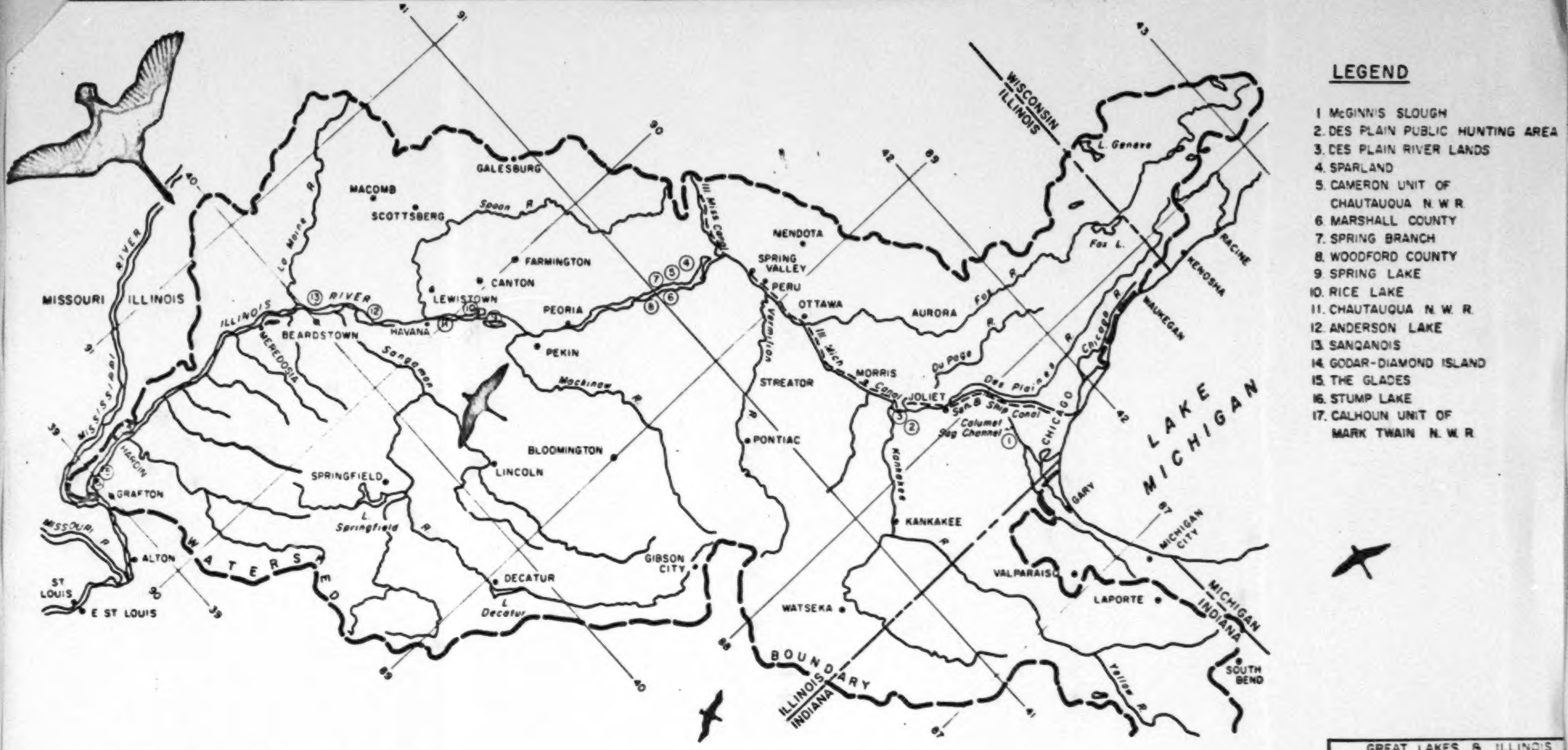
"There is no vision to see, there is no time to learn, that land units with their natural occupants, as exemplified by a beaver meadow, a muskrat marsh, a duck lake - - - are productive entities that under certain circumstances may be worth far more than anything man can put in their place and that once destroyed may never be re-established" (18).

Public

Since 1940 the Illinois Department of Conservation has acquired over 15,000 acres along the Illinois River for public waterfowl hunting and refuges. Map figure 34, together with Table 14, locates and presents data on all public wildlife management areas along the Illinois River.

About half of each State-owned area is maintained as a refuge or rest area, while the remaining half is open to shooting out of the registered blinds. During the waterfowl season a checking station is maintained on all of the large areas.

Boats, decoys, and food are available on most areas. Since most of these units are operated under the multiple-use concept, facilities for fishermen, campers, and picnickers are also provided.


LEGEND
1 McGINNIS SLOUGH
2. DES PLAIN PUBLIC HUNTING AREA
3. DES PLAIN RIVER LANDS
4. SPARLAND
5. CAMERON UNIT OF CHAUTAUQUA N. W. R.
6. MARSHALL COUNTY
7. SPRING BRANCH
8. WOODFORD COUNTY
9. SPRING LAKE
10. RICE LAKE
11. CHAUTAUQUA N. W. R.
12. ANDERSON LAKE
13. SANGANOIS
14. GODAR-DIAMOND ISLAND
15. THE GLADES
16. STUMP LAKE
17. CALHOUN UNIT OF MARK TWAIN N. W. R.
WISCONSIN
ILLINOIS
L. Geneva
Fox L.
RACINE
KENOSHA
WAUKEGAN
Chicago R.
LAKE MICHIGAN
CHICAGO
GARY
MICHIGAN CITY
MICHIGAN
INDIANA
SOUTH BEND
LAPORTE
VALPARAISO
Yellow R.
Des Plaines R.
Du Page R.
Fox R.
AURORA
San. & Ship Canal
Calumet Sag Channel
JOLIET
MORRIS
Ill. Mich. Canal
Kankakee R.
KANKAKEE
WATSEKA
BOUNDARY
ILLINOIS
INDIANA
MENDOTA
SPRING VALLEY
PERU
OTTAWA
Vermilion R.
STREATOR
PONTIAC
Ill. Miss. Canal
GALESBURG
MACOMB
SCOTTSBERG
Spoon R.
FARMINGTON
CANTON
LEWISTOWN
PEORIA
PEKIN
Mackinaw R.
BLOOMINGTON
LINCOLN
GIBSON CITY
DECATUR
L. Decatur
HAVANA
BEARDSTOWN
Sangamon R.
ILLINOIS RIVER
MEREDOSIA
La Moine R.
SPRINGFIELD
L. Springfield
MISSOURI
ILLINOIS
MISSISSIPPI RIVER
MISSOURI R.
HARDIN
GRAFTON
ALTON
ST LOUIS
E ST LOUIS
WATERSHED
43
42
41
40
39
91
90
89
88
87

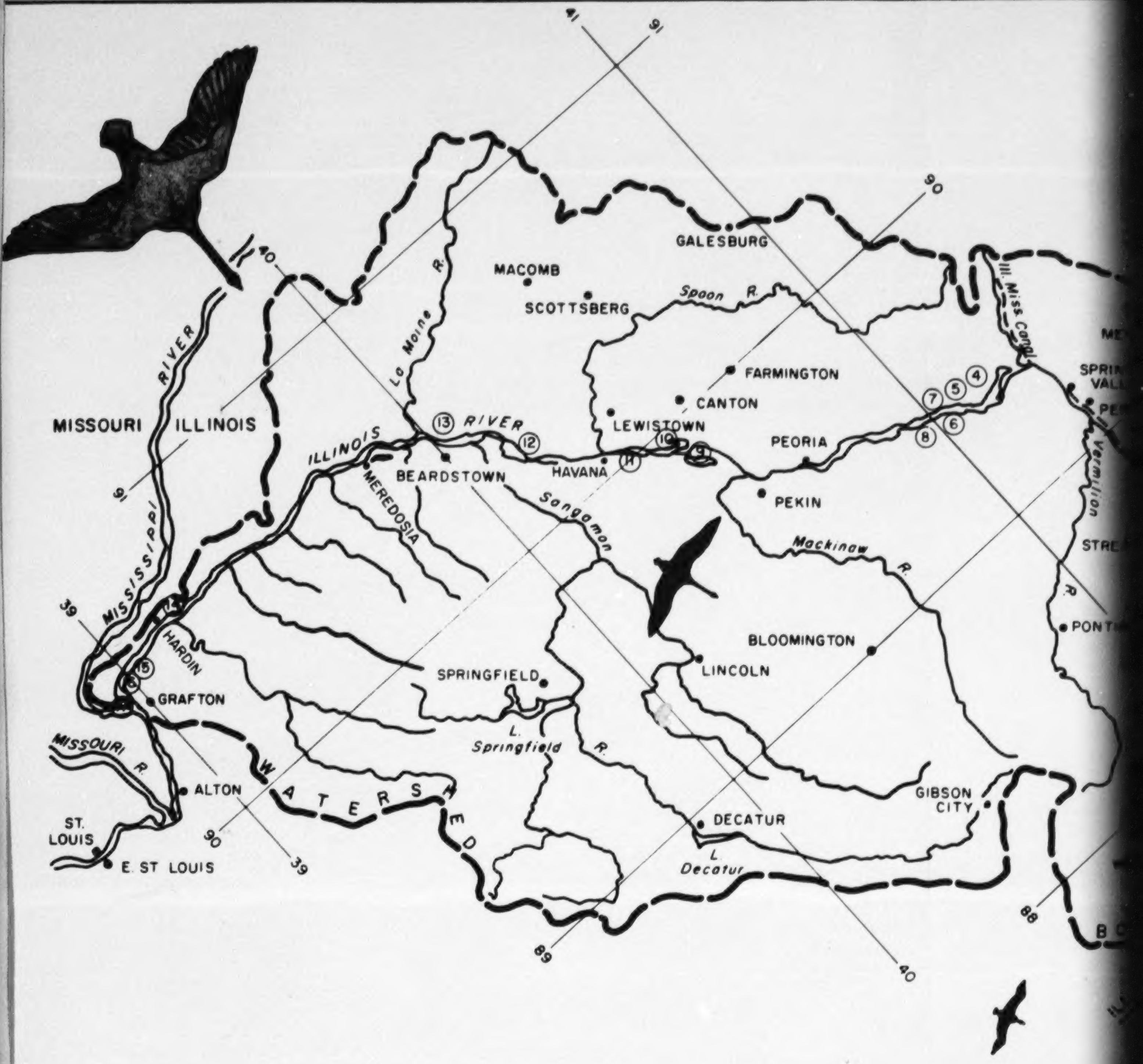
NOTE: DETAILED INFORMATION ON PUBLIC MANAGEMENT MAY BE FOUND IN TABLE 14.

GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

ILLINOIS RIVER BASIN
PUBLIC WATERFOWL
MANAGEMENT AREAS

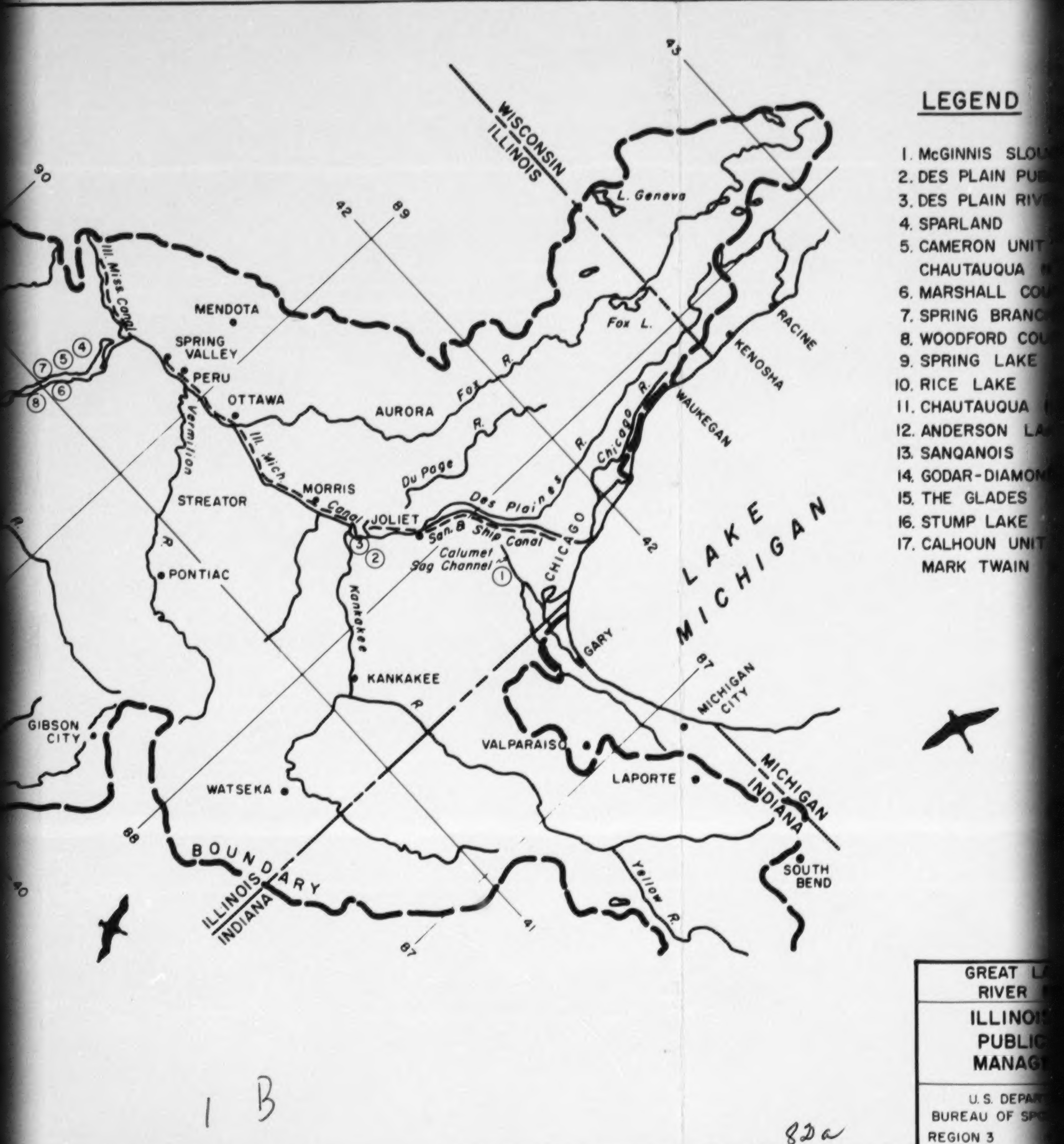
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND W
REGION 3 MINNEAPOLIS, MINNES

FIGURE 3


41
91
90
40
GALESBURG
MACOMB
SCOTTSBERG
Spoon R.
La Moine R.
Ill. Miss. Canal
FARMINGTON
CANTON
LEWISTOWN
MISSOURI
ILLINOIS
MISSISSIPPI RIVER
91
ILLINOIS RIVER
13
12
11
10
9
8
7
6
5
4
PEORIA
BEARDSTOWN
HAVANA
MEREDOSIA
Sangamon R.
PEKIN
Mackinaw R.
Vermilion R.
BLOOMINGTON
LINCOLN
SPRINGFIELD
L. Springfield
39
HARDIN
15
GRAFTON
MISSOURI R.
ALTON
ST. LOUIS
E. ST LOUIS
WATERSHED
DECATUR
L. Decatur
GIBSON CITY
90
39
89
40
88

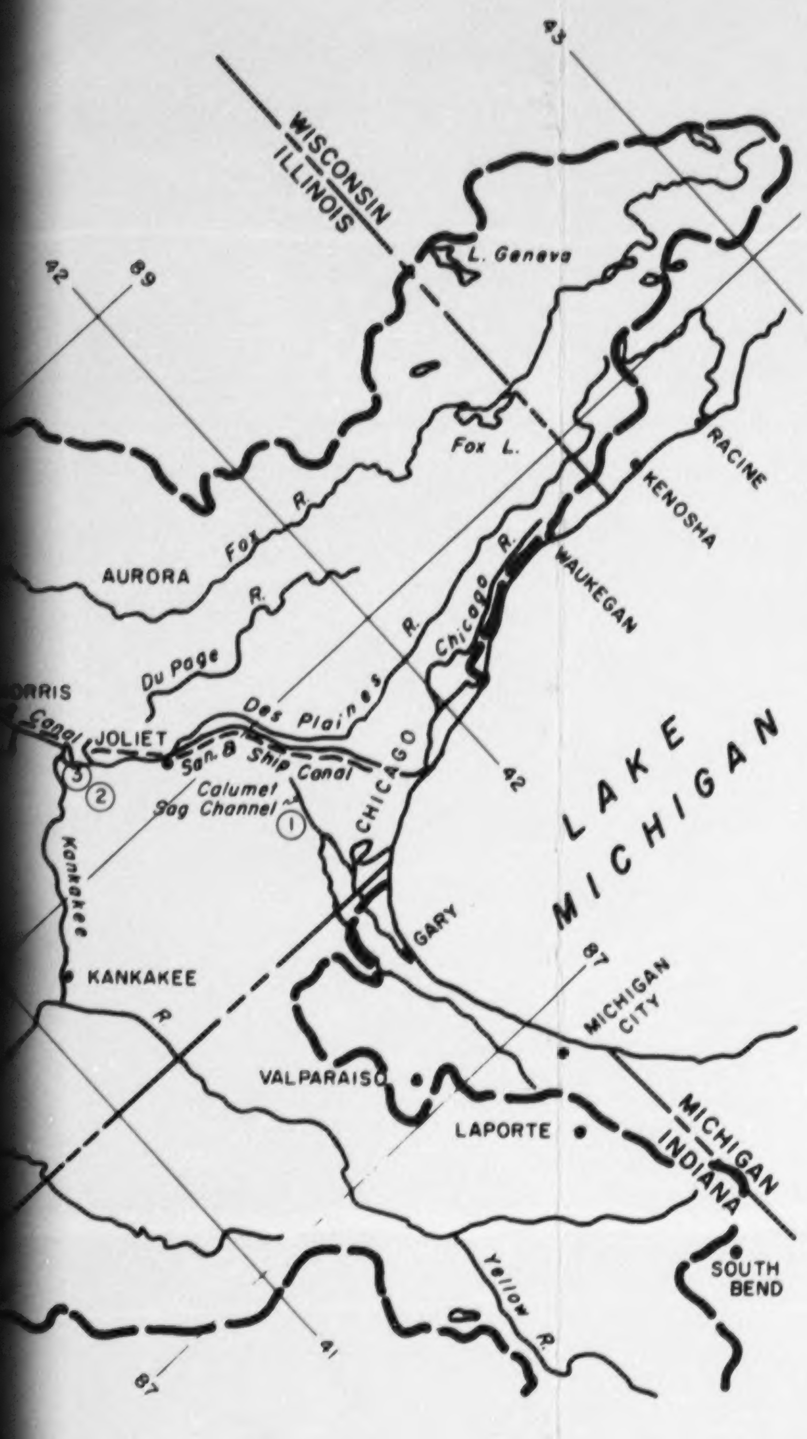
NOTE: DETAILED INFORMATION ON PUBLIC MANAGEMENT
MAY BE FOUND IN TABLE 14.

A


LEGEND
1. McGINNIS SLOU
2. DES PLAIN PUB
3. DES PLAIN RIV
4. SPARLAND
5. CAMERON UNIT
CHAUTAUQUA
6. MARSHALL COU
7. SPRING BRANC
8. WOODFORD COU
9. SPRING LAKE
10. RICE LAKE
11. CHAUTAUQUA
12. ANDERSON LA
13. SANQANOIS
14. GODAR-DIAMON
15. THE GLADES
16. STUMP LAKE
17. CALHOUN UNIT
MARK TWAIN
GREAT LA
RIVER
ILLINOIS
PUBLIC
MANAG
U.S. DEPAR
BUREAU OF SP
REGION 3
WISCONSIN
ILLINOIS
ILLINOIS
INDIANA
MICHIGAN
INDIANA
BOUNDARY
LAKE MICHIGAN
L. Geneva
Fox L.
Fox R.
Du Page R.
Des Plaines R.
Chicago R.
Ill. Miss. Canal
Ill. Mich. Canal
San. & Ship Canal
Calumet Sag Channel
Vermilion R.
Kankakee R.
Yellow R.
MENDOTA
SPRING VALLEY
PERU
OTTAWA
AURORA
MORRIS
JOLIET
STREATOR
PONTIAC
KANKAKEE
GIBSON CITY
WATSEKA
CHICAGO
GARY
VALPARAISO
LAPORTE
MICHIGAN CITY
SOUTH BEND
RACINE
KENOSHA
WAUKEGAN
43
42
42
41
40
90
89
88
87
87
1
2
3
4
5
6
7
8

1 B

82a


43
WISCONSIN
ILLINOIS
L. Geneva
42
89
Fox L.
RACINE
KENOSHA
Fox R.
AURORA
Du Page R.
Des Plaines R.
Chicago R.
WAUKEGAN
ORRIS
Canal
JOLIET
San. & Ship Canal
3
2
Calumet Sag Channel
1
CHICAGO
42
LAKE MICHIGAN
Kankakee
GARY
KANKAKEE
R.
87
MICHIGAN CITY
VALPARAISO
LAPORTE
MICHIGAN
INDIANA
SOUTH BEND
Yellow R.
41
87

LEGEND

1. McGINNIS SLOUGH
2. DES PLAIN PUBLIC HUNTING AREA
3. DES PLAIN RIVER LANDS
4. SPARLAND
5. CAMERON UNIT OF CHAUTAUQUA N. W. R.
6. MARSHALL COUNTY
7. SPRING BRANCH
8. WOODFORD COUNTY
9. SPRING LAKE
10. RICE LAKE
11. CHAUTAUQUA N. W. R.
12. ANDERSON LAKE
13. SANQANOIS
14. GODAR-DIAMOND ISLAND
15. THE GLADES
16. STUMP LAKE
17. CALHOUN UNIT OF MARK TWAIN N. W. R.

C

GREAT LAKES & ILLINOIS
RIVER BASINS PROJECT

ILLINOIS RIVER BASIN
PUBLIC WATERFOWL
MANAGEMENT AREAS

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
REGION 3 MINNEAPOLIS, MINNESOTA

82a

FIGURE 34

Management areas, such as Stump Lake, Glades, Chautauqua, Sanganois and Spring Lake, are being developed with dikes, water control structures, and pumps so that water levels can be controlled. Manipulation of the water levels, together with seeding of waterfowl food plants (usually Japanese millet), greatly increases the value of the area for ducks. Upland food patches are maintained on several areas with the actual work being done under share-crop agreements with local farmers. The State's share is often left in the field to serve as winter food. All areas are closed to boat fishing during the waterfowl season.

In 1954 almost 29,000 acres of excellent waterfowl habitat along the lower Illinois and Mississippi Rivers was turned over to the Illinois Department of Conservation by the U.S. Army Corps of Engineers under a cooperative management agreement. About 7,900 acres of this total lie along the Illinois River and include the Stump Lake, Glades, and Godar-Diamond Island areas.

Waterfowl management on these areas is similar to the State-owned units except that at present an accelerated development program is being carried on. Aerial seeding of Japanese millet on the mud flats, spraying of noxious vegetation, reflooding of the food patch areas using a high volume barge-mounted pump, construction of dams, small boat channels, access roads, parking areas, and launching ramps are some of the activities now being carried out.

Two National Wildlife Refuges are located on the Illinois, Chautauqua near Havana, and the Calhoun Unit of the Mark Twain Refuge near Grafton.

Table 14. Size, Use, and Management of Seventeen Publicly-Owned Wildlife Areas Along the Illinois River Mainstem

No.	Name	Management Agency	Total Acres	Acres of Water	Type of Hunting	Acres of Improved Wildlife Food
1.	McGinnis Slough	Cook Co. F.Pres.	314		Refuge	
2.	Des Plaines Pub. Hunting Area	Ill.Dept.Cons.	4,200		Rabbits Pheasants	
3.	Des Plaines River Lands	Ill.Dept.Cons. w/U.S.C.of E.	475		Waterfowl	
4.	Sparland	Ill.Dept.Cons.	1,280	1,100	Waterfowl	
5.	Cameron Unit of Chautauqua NWR	U.S. F & WL Service	640		Refuge	
6.	Marshall Co.	Ill.Dept.Cons.	2,630	2,200	Waterfowl	
7.	Spring Branch	Ill.Dept.Cons.	410	60	Waterfowl	
8.	Woodford Co.	Ill.Dept.Cons.	2,900	2,200	Waterfowl	40
9.	Spring Lake	Ill.Dept.Cons.	1,550	900	Waterfowl	
10.	Rice Lake	Ill.Dept.Cons.	2,530	2,300	Waterfowl	160
11.	Chautauqua NWR	U.S. F & WL Service	4,470	4,127	Refuge (555 acres open to waterfowl hunting)	20
12.	Anderson Lake	Ill.Dept.Cons.	1,915	1,800	Waterfowl	None
13.	Sanganois	Ill.Dept.Cons.	7,180	3,800	Waterfowl	200
14.	Goder-Diamond Isl.	Ill.Dept.Cons. w/U.S.C.of E.	8,087		Waterfowl	1,285
15.	The Glades	" "			Waterfowl	
16.	Stump Lake	" "			Waterfowl	
17.	Calhoune Unit Mark Twain NWR	U.S. F & WL Service	4,580		Refuge (Portion open to small game hunting)	

A very recent addition is the Cameron Unit of Chautauqua Refuge resulting from a gift of 640 acres near Sparland. This consists of the uplands adjacent to Weis Lake which will be developed principally for geese. The locations of these areas are also shown on Figure 34.

Lake Chautauqua, established as a waterfowl refuge in 1936, is an example of the tremendous benefit to fish and wildfowl gained when a drainage and levee district is allowed to revert to its natural state. In the past, Chautauqua has supported populations of over 1½ million ducks as well as several thousand Canada, blue, and snow geese. Lake Chautauqua is equally famous as a public fishing area.

Only a small area at the mouth of the Illinois River is a part of the Mark Twain Refuge; however, the many islands of this delta area provide food patch sites. Water quality in this area is also considerably better, and greater production of natural food is apparent.

Private

Since much of the waterfowl habitat in the Illinois bottom lands is controlled by private duck hunting clubs, the operation and management practices carried on by these groups have a greater cumulative effect on the waterfowl population using the river than management on the scattered public tracts.

While actual management carried on by the more than 300 clubs varies widely in type and amount, almost all clubs conduct one or more worthwhile programs. It is of interest to note that many of the original habitat improvement practices were begun by the clubs rather than by public agencies specializing in waterfowl management.

About 30 very large clubs control extensive acreages of the best habitat. One such organization owns 2,000 acres, 95 per cent of which is water or wetland areas. On this area several miles of levees have been constructed so that water levels can be manipulated and controlled by means of strategically placed stop-log or gate-valve structures. Spring floods often do considerable damage to the levee system, and the club owns a dragline and bulldozer for maintenance and repair.

On these large club areas, about half of the acreage is normally set aside as an inviolate refuge. Shooting practices are often more restrictive than the State and Federal regulations. The large club usually has rather elaborate clubhouse facilities, boats, motors, decoys, and a full-time manager.

This type of operation obviously adds up to a very large original investment and annual operating cost. Under present waterfowl regulations the average cost per duck bagged by a member of one of these large clubs can be as high as $100. Figures 35, 36, 37 and 38 are photographs of physical developments on private duck clubs.

Discussion of the Water-Wildlife Problems

"The objectives of water quality criteria for the protection of aquatic life is to preserve or restore environmental conditions essential for its growth, reproduction and well being" (10).

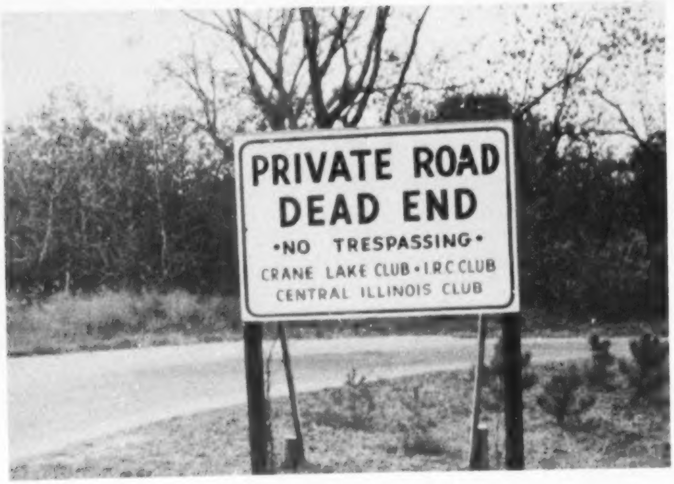

PRIVATE ROAD
DEAD END
•NO TRESPASSING•
CRANE LAKE CLUB • I.R.C CLUB
CENTRAL ILLINOIS CLUB

Figure 35. A Private Duck Club Entrance Sign

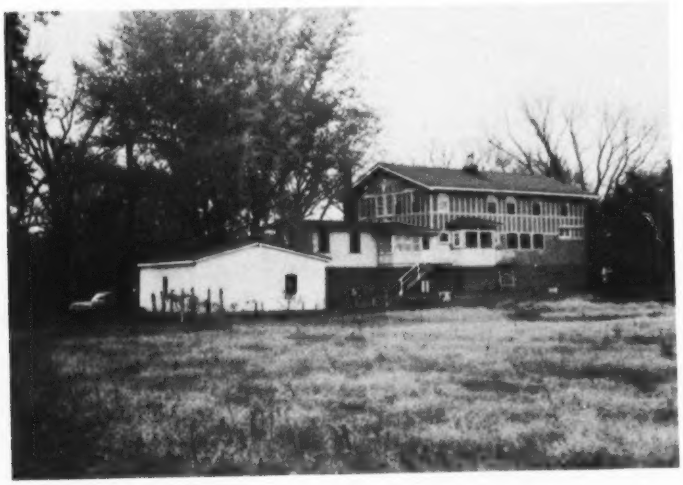


Figure 36. A Private Area Clubhouse near Bath, Illinois

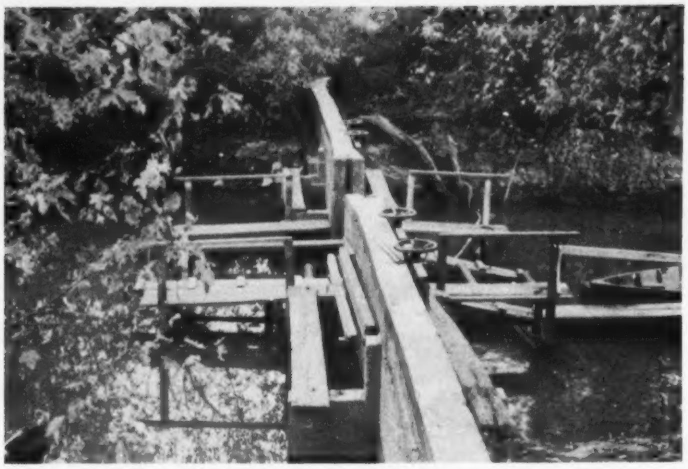


Figure 37. A Private Management Area Water Control Structure

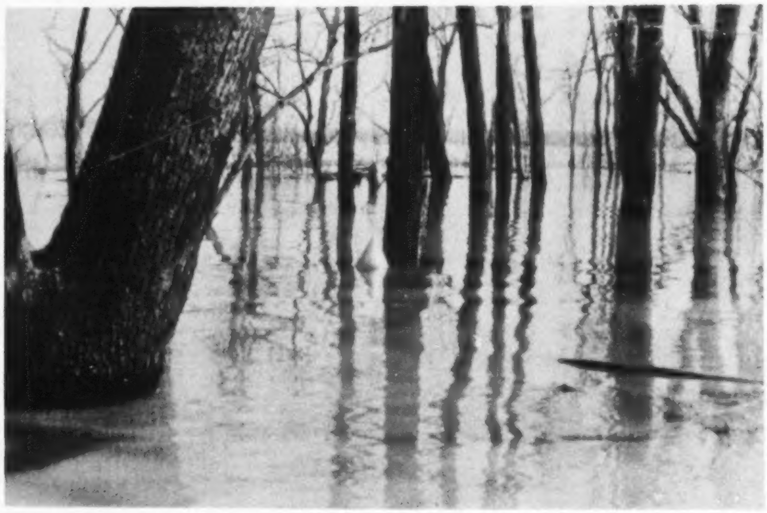


Figure 38. Flood Conditions near Havana, Illinois, Spring 1962
Note Top of Wood Duck Nest Box

Any discussion of water quality and its effects on migratory waterfowl and aquatic furbearers must also concern itself with an understanding of water levels, bottom conditions, wildlife food habits, and shape of the flood plain lake basins since all of these factors are inter-related.

Upstream from Spring Valley, located 100 miles below Chicago, the effects of industrial pollution and sewage along with the heavy commercial use of the narrow channel combine to make this region of very low value to wildlife. Downstream from Spring Valley for the next 140 miles wildlife values are extremely high. The remaining flood plain lakes along this portion of the river are the areas of greatest concern.

The waters are extremely turbid mostly due to a heavy suspension of silt but, in part, the result of suspended waste materials or an abundance of pollution killed micro-organisms. As can be seen from Table 15 a major source of the suspended solids is soil carried by the tributary streams. Water samples taken at tributary outlets during the spring season reveal especially heavy silt loads. However, even during periods of extremely low runoff the waters do not clear. Accumulations of silt form a false bottom on all flood plain lakes several feet thick. The water depth is usually less than 3 feet and quite uniform as shown in the following sketch.

PROFILE OF TYPICAL FLOOD PLAIN LAKE

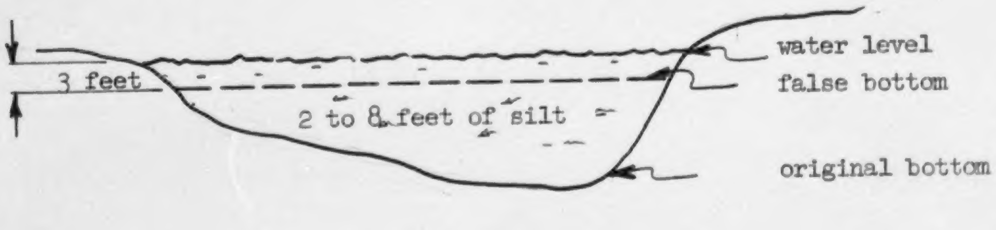


Table 15. Suspended Solids in Parts Per Million at Various Sampling Stations Along the Illinois Waterway

Station		Study Periods - Averages	
Mileage	Location	November '61	March '62
280.8T	DuPage River	28	100
278.7T	Kankakee River	67	77
271.6	Dresden Dam	40	109
270.6	E.J. & E. RR Bdg.	40	98
263.5	Morris Hwy. Bg.	52	72
252.7	Seneca Hwy. Bg.	53	114
246.9	Marseilles - Rapid	50	123
246.9	Marseilles Canal	49	N.S.
240.2	Sherer Island	45	62
241.1T	Fox River (Tributary)	138	115
239.2	Hitt Island	82	68
231.6	Starved Rock	46	94
229.7	Utica Bg. Light	52	91
236.5T	Vermillion River	32	244
219.8	Huse Slough	N.S.	N.S.
209.4	Bureau Creek	29	80
198.1	Webster Ldg.	N.S.	N.S.
184.8	Bennett's Lt.	84	55
181.3	Chilicothe Lt.	N.S.	N.S.
173.4	Blue Creek Lt.	75	42
168.9	Drolls Pt. Lt.	N.S.	N.S.
166.1	Peoria W. Intake	40	38
165.3	Avery Light	N.S.	N.S.
161.7T	Kickapoo Creek	113	193
158.7	Warn Sign	77	56
156.5	Seven Mile Lt.	77	42
161.0T	Mackinaw River	145	198
151.8	Pekin Intake	N.S.	N.S.
143.2	Lancaster Lt.	102	108
132.0	Woodyard Lt.	N.S.	N.S.
125.8	Thompson Lt.	169	94
133.7T	Spoon River	399	311
117.6	Havanna Lt.	N.S.	N.S.
105.5	Grand Island Lt.	272	114
105.7T	Sangamon River	158	181
100.9	Hickory Lt.	N.S.	N.S.
88.0	Beardstown Br.	421	76
95.8T	LaMoine River	162	231
81.0	LaGrange Mk.	337	116
78.6	Indian Creek Lt.	250	80

N.S. - Not Sampled
T - Sample Taken at Mouth of Tributary Stream

This deposited layer of ooze is very unstable and even light winds or the activity of bottom-feeding fishes cause enough distrubance to resuspend the silt particles and maintain the turbid water conditions. This lack of transparency together with the unstable bottom practically eliminates rooted aquatic growth.

Although this siltation has been occurring for many years, modern farm machinery, recent changes in crops grown, strip mining, and suburb and highway construction have accelerated the rate. Since much of the original flood plain is now protected by a series of levees, this large amount of suspended material is being deposited over a drastically reduced area of remaining flood plain lakes with the result that these areas are rapidly losing their water storage capacity. The unstable bottom condition and loss of water areas also have a detrimental effect on benthic fauna and fish production. Not only have waterfowl populations been affected but also other forms of bird life such as herons and egrets which add much to the esthetic enjoyment of wetland areas.

A study of the benthic fauna in three flood-plain lakes near Havana, Illinois, during the period July 1952 to April 1958 (26) was conducted to explore . the effects of various pollutants on these valuable organisms. Research on this subject has to date, been very limited; and since this study was conducted on waters of high wildlife value, it is extremely significant to the present study and is quoted at length in the following discussion:

> "In late winter and early spring of 1953 lesser scaup ducks occurred abundantly in Quiver Lake. The maximum number of scaup ducks present at one time on the lake that year was

> was about 20,000. Since 1953 very few scaup ducks have used the lake. The maximum number we have seen on the lake since 1953 has been less than 1,000 birds."
>
> "The lesser scaup ducks were observed on numerous occasions by us in early 1953 to be diving apparently for small Mollusca which were then abundant in the lake."

Many food habits studies have shown small Mollusca to be an important item in the diet of the lesser scaup.

> "We believe that the scarcity of scaup ducks on Quiver Lake after early 1953 was associated with the disappearance of small snails and the decline of fingernail clams that occurred at that time."

As was previously pointed out, a corresponding decline occurred throughout the mid-Illinois River Valley at this same time--a period during which waterfowl numbers of the Mississippi Flyway were actually increasing.

> "In 1952 fingernail clams were extremely abundant in Middle Quiver Lake, amounting to 2,286 per square foot. . . In the following year their numbers dropped to 103 per square foot. . . Between 1954 and 1958 the numbers of fingernail clams varied between 0 and 50 per square foot. . .
>
> "Siltation and other forms of pollution were considered important factors in the drastic changes that have occurred in the bottom fauna of the lakes studied."

> ". . . . . there is also the possibility that one or more of the new organic chemical exotics in the river, such as detergents, could have adversely affected the Molluscan population in Quiver Lake in 1953."

In view of the speed at which the transition took place and the simultaneous increase in the use of detergents, further research to explore this possible connection is needed.

The grain feeding species - mallards, pintails, and black ducks - are able to supplement natural food supplies by utilizing waste corn; however, even this food source is in danger. Ten years ago approximately 10 per cent of the corn crop was wasted and remained in the field after harvest. Today as the result of the improved picker-sheller units only about 5 per cent is lost in harvest operations. Also the larger plows and more powerful tractors enable the farmer to fall plow a larger portion of his fields. Improvements in agricultural equipment of this type are bound to continue. Mallards will now range up to 40 miles to find waste corn but a definite relationship exists between the amount of energy obtained from feed and the energy expended in obtaining it.

If waterfowl food requirements are to be met, it must be through the encouragement and propagation of the moist soil plants such as rice cutgrass, millet, and smartweed in the flood plain lake region.

Flood plain lakes may generally be divided into three categories:

1. Dewatering lakes - These are directly connected with the river and their water levels are completely dependent upon river stage.

2. Semi-stable lakes - These are separated from the river by low natural or artificial barriers which are quite often over-topped by a raise in river stage.

3. Conservation pools - These lakes are separated from the river by high dikes and natural barriers which are only over-topped by flood conditions.

Studies have shown that the dewatering lakes are considerably more attractive to the dabbling ducks than the other two types because they have the greater area of moist soil food plants (26). However, rises in the river stage during August and September occasionally kill out this growth and cause serious food shortages. These minor floods are sometimes aggravated by increases in water diversion from Lake Michigan presumably to flush out the upper waterway.

The only reliable source of food are those stable and semi-stable lakes where water levels are controlled and manipulated for the sole purpose of growing moist soil plants. Operations of this type carried on by many gun clubs and public agencies usually consist of the following steps:

Step 1.

June 1 to July 15 - Lower water levels sufficiently to expose large area of mud flats.

Step 2.

June 15 to July 31 - Seed areas which do not show a natural growth of desirable plants.

Step 3.

July 31 to October 1 - Maintain proper moist soil conditions to insure maximum growth and seed production.

Step 4.

October 1 to end of duck hunting season - Gradually re-flood these feeding areas so that new food supplies are made available as soon as previously flooded sources are consumed.

Several serious problems are involved in accomplishing three steps at the proper times. Step 1 cannot take place until spring floods have subsided to the point that main stem water levels are below flood plain lake levels. This difference in water levels is very critical and often not great enough to allow maximum dewatering by gravity flow. Also the publicly-owned flood plain lakes are often very popular fishing areas and lowering of water levels together with the extensive mud flats brings considerable opposition from local fishermen.

It is often necessary to employ light aircraft to accomplish the seeding of mud flat areas (Step 2) since they will not support the weight of wheel or track-type machines. This has been successful but does increase the costs.

During the growing season of Step 3 unseasonal flooding occasionally kills out the moist soil plants on areas where levees are too low to prevent inundation.

Ideal conditions for Step 4 occur only during those years when fall floods are of such magnitude and duration that river levels remain higher than the flood plain lake levels during the period of migration and reflooding can be accomplished by simply opening the gates of the control structures.

Unfortunately, this condition prevails only about one year out of four or five and can never be relied upon. It is, therefore, necessary that waterfowl management areas be equipped with large volume pumps to move the water from the river to the adjacent flood plain lakes.

This procedure has for many years been reasonably successful in providing a supply of duck food sufficient to assure good hunting. Actually it has done more than this--it has provided a great food supply to much of the Mississippi Flyway population before they reach the coastal wintering areas.

Wildlife management along the Illinois River by both public and private agencies consists almost entirely of measures designed to mitigate the losses suffered from drainage, pollution (including siltation), water diversion, flood control, commercial uses, and modifications of the waterway. These measures are accomplished by elaborate and expensive systems of dikes, dams, levees, and pumps which control water levels in the remaining flood plain lake areas and reproduce artifically the conditions which existed in these areas prior to 1900.

The ability to carry on this type of waterfowl management, which is vitally necessary to maintain the present migration pattern, would be seriously threatened if:

1. Private management efforts decrease and are not compensated for by additional public effort.
2. Main stem river pool elevations are raised by continual increased diversion or change in the operations of the locks and dams.

3. Water quality is allowed to degrade further especially from the uncontrolled addition of waste chemicals, the effects of which on aquatic life are unknown.
4. Siltation is allowed to continue at the present rate until the water storage capacity of the flood plain lakes is lost.
5. Further drainage reduces the area of flood plain lakes.
6. Multiple recreational uses of public waterfowl management areas are carried out without proper advance planning to insure that waterfowl needs will not be jeopardized.

Occasionally fish and wildlife kills occur on the Illinois River as the direct result of a foreign substance suddenly being added to the water. During the latter part of January 1961, about 1,000 black ducks died when a large industrial plant accidentally discharged an oily substance into an area of open water created by the warmer water from a storm sewer outfall. Ducks using this open water soon became coated with oil permitting cold water to penetrate to the skin and reduce mobility. Many individuals were found on shore where they presumably froze to death. Possibly others became so water-logged that they drowned and were not recovered.

Waterfowl kills resulting from oil pollution are serious in places where circumstances exist which regularly bring large numbers of ducks in contact with oil-covered waters. On the Illinois River, however, this situation occurs but rarely and then only by accident.

It is unfortunate that the publicity and resulting public concern over this type of loss is so much greater than that accorded the much more serious losses in the form of continuous pollution and siltation which slowly degrade and eventually destroy aquatic habitat. Though actual kills may not be evident, habitat losses are, for the most part, irretrievable and adversely affect entire future populations.

ACKNOWLEDGMENT

In consideration of the time available and the geographic scope of this study, the facts and figures herein reported would not have been available without much assistance.

It is to those individuals and agencies who so generously cooperated in this study we offer our sincere appreciation.

STATE OF ILLINOIS
DEPARTMENT OF CONSERVATION
SPRINGFIELD

WILLIAM T. LODGE
DIRECTOR

August 5, 1963

RB

Mr. W. P. Schaefer, Chief
Division of Technical Services
Bureau of Sport Fisheries and Wildlife
1006 West Lake Street
Minneapolis 8, Minnesota

Dear Mr. Schaefer:

Our Fisheries and Game Management Sections have reviewed the report "Fish and Wildlife as Related to Water Quality of the Illinois River Basin," forwarded to us on July 16.

I am enclosing herewith Comments and Suggestions on the Wildlife Section. The Fisheries Section concurs with the data as written in this report.

Yours very truly,

William T Lodge

William T. Lodge
Director

WTL:dj
cc - Thomas R. Evans
William J. Harth

Comments and Suggestions
on
Wildlife Section

Page 48 -- Line 4

10% too low, unless state and federal lands are not considered as open to the free-lance hunter.

Page 57 -- Line 8

Probably should read: "_ _ _ _ along some of the tributary streams, in the Mason State Forest and along the main stem downstream from Hardin to the mouth."

As the sentence is now written, it reads as though the Mason State Forest was below Hardin.

Page 65 -- 2nd sentence

Perhaps this should read, "_ _ _ _, and only California and Texas surpass it outside the Flyway," Otherwise it sounds like Illinois might be 3rd nationally when it is 2nd to 4th in the Flyway.

Page 66 -- After first sentence, add:

"Under a third system, blind building sites are assigned on an annual drawing basis.

LIST OF REFERENCES

1. Forbes, Stephen A. and Richardson, Robert E.
"The Fishes of Illinois" (Second Edit.) Natural History Survey Illinois, Vol. 3. (1920).

2. Forbes, Stephen A. and Richardson, Robert E.
Atlas. To accompany a report on the "Fishes of Illinois."

3. Starrett, William C. and McNeil, Perl L. Jr.
"Sport Fishing at Lake Chautauqua, near Havana, Illinois, in 1950 and 1951." Illinois Natural History Survey., Biol. Notes No. 30, (1952).

4. Walraven, W. B., et al.
"Potential Conservation Areas Along the Illinois River as a part of Flood Protection," Illinois Department of Conservation (1960)

5. Starrett, William C.
"Fishery Values of a Restored Illinois River Bottomland Lake." Trans. Ill. Academy of Science, Vol. 50, (1957) pp. 44-48

6. Anon. "Sport Fishing - Today and Tomorrow." Dept. Bur. Sport Fish. and Wildlife USDI (1962)

7. Richardson, Robert E.
"The Bottom Fauna of the Middle Illinois River, 1913-1925." Ill. Nat. Hist. Survey, Vol. XVII., (1928).

8. Thompson, David H.
"The Knothead Carp of the Illinois River," Ill. Nat. His. Surv., Vol. XVIII, (1928).

9. Paloumpis, Andreas A., and Starrett, William C., "An Ecological Study of Benthic Organisms in Three Illinois River Flood Plain Lakes." Am. Mid. Nat., Vol. 64, No. 2, pp. 406-435, October (1960)

10. Tarzwell, Clarence M., "Water Quality Criteria for Aquatic Life," U.S.D.H.E.W., (1957)

11. Starrett, William C., and Jackson, Harry O., "Turbidity and Sedimentation at Lake Chautauqua, Illinois." Journ. W.L. Mgt., Vol. 23, No. 2, (1959) pp. 157-168

12. Starrett, William C., Private communication, (1963)

13. Anon., "Illinois Historical Anecdotes" W.P.A. (1940)

14. Leffingwell, Wm. Bruce, "Wildfowl Shooting," Rand, McNally & Co. (1890)

15. Bellrose, Frank C. "Duck Populations and Kill - An Evaluation of some Waterfowl Regulations in Illinois." Illinois Nat. History Surv. Bulletin, Vol. 23, Art. 2

16. Leopold, Aldo, "Report on a Game Survey of the North Central States," Sporting Arm and Ammunition Manufacturers Institute (1931)

17. Atlas of Illinois Resources - Section 3 Forest, Wildlife and Recreational Resources. (1960)

18. Kenney, F. R., and W. L. McAtee, "Soils and Men," U. S. Department of Agriculture, Yearbook 1938

19. Greeley, Frederick et al., "Distribution and Abundance of Pheasants in Illinois," Ill. Nat. History Survey Biol. Notes #47 (1962)

20. Brown, Louis and Lee Yeager, "Fox Squirrels and Grey Squirrels in Illinois" Ill. Nat. History Survey Bulletin Vol. 23, Art. 5 (1945)

21. Bellrose, Frank C., "A Relationship of Muskrat Populations to Plants," Journal of Wildlife Management, Vol. 14, #3 (1950)

22. Kartright, Francis H., "The Ducks, Geese and Swans of North America," The American Wildlife Institute (1943)

23. Data reproduced by permission of Frank C. Bellrose, Illinois Natural History Survey, Havana, Illinois (1962)

24. Anderson, Harry, "Food Habits of Migratory Ducks in Illinois," Illinois Natural History Survey Bulletin, Vol. 27, Art. 4 (1959)

25. Bellrose, Frank C., "Duck Food Plants of the Illinois River Valley." Illinois Natural History Survey Bulletin, Vol. 21, Art. 8 (1941)

26. Loomis, Forrest D., "The Effect of Water Levels on Duck Food Plants and Duck Populations in the Illinois Valley." Illinois Nat. Hist. Survey (1955)